

Tolt River Natural Area Site Management Guidelines

March 2006



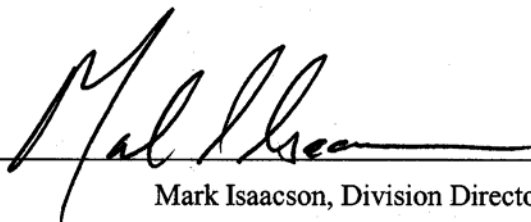
King County

Department of Natural Resources and Parks

Water and Land Resources Division

Tolt River Natural Area Site Management Guidelines

March 2006



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King County Water and Land Resources Division



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Executive Summary

The Tolt River Natural Area is a King County Department of Natural Resources and Parks Ecological Land managed for the protection of ecological values and, where appropriate, public access. The Tolt River Natural Area is located approximately two miles east of the City of Carnation in unincorporated King County. The 240-acre property consists of several parcels that lie within the Tolt River's 100-year floodplain for a discontinuous 3.5-mile stretch, from RM 2.1 to approximately RM 5.5. The site contains a combination of riparian and upland forest habitat types as well as substantial gravel bars.

The Tolt River Natural Area is a work in progress, as efforts are underway to acquire additional undeveloped parcels in this reach of the Tolt River, which will eventually be added to the Tolt River NA. Currently, the Natural Area consists of thirteen parcels purchased to protect the areas remaining high quality salmon habitat, specifically chinook winter rearing and juvenile habitat. The Tolt River Natural Area was acquired in several phases as part of the Endangered Species Act (ESA) early action – Tolt/Snoqualmie. The original parcels were acquired with a combination of funding and grants from the Salmon Recovery Funding Board, King Conservation District and Conservation Futures. In December 2004, the two northern parcels were added as part of the acquisition of development rights on the Snoqualmie Tree Farm from the Hancock Timber Resource Group.

The Tolt River Natural Area contains significant habitat for a variety of fish and wildlife species. The Tolt River in the vicinity of the Tolt River Natural Area offers high quality spawning habitat for chinook salmon, which are listed as threatened under the federal ESA. The Tolt River provides essential habitat for nearly one fifth of the chinook salmon that return to the Snoqualmie River to spawn. The Tolt River Natural Area reach is identified in the 2004 King County Comprehensive Plan as part of the wildlife habitat corridor which provides habitat for a variety of birds and mammals.

Current public use at the Tolt River Natural Area is minimal due to the limited access, lack of formal trails and general undeveloped character. Public use occurs most frequently in the summer months directly off of Tolt River Road NE where opportunities for nature observation, boating, fishing and swimming are available. In addition, the natural area contains several informal trails that have no public access and are used exclusively by neighboring landowners. The current level of public use appears to have no adverse effect on the site's ecological resources.

The goals for the Tolt River Natural Area are 1) to conserve and enhance ecological value, and 2) accommodate appropriate public uses that do not harm ecological resources. The following are planning and management recommendations that are designed to support these goals.

- Continue acquisition of adjacent properties to preserve and protect the Tolt River Natural Area reach.
- Plant native trees and shrubs and control noxious, invasive and non-native plant species to provide a structurally diverse and functioning forested floodplain.
- Seek funding sources and grants for projects that enhance the site's ecological resources.
- Implement preserve and protect measures to limit inappropriate public use in rare and sensitive areas.
- Meet with adjacent landowners to inform them as to the goals and purpose of the Tolt River Natural Area.
- Monitor public use activities and impacts on ecological systems to inform management decisions.

Tolt River Natural Area Site Management Guidelines

Introduction

The Tolt River Natural Area is a King County Department of Natural Resources and Parks (DNRP) Ecological Land. Ecological Lands are a category of Water and Land Resources Division (WLRD) properties managed for the protection of their ecological value. Appropriate public access and educational opportunities are accommodated on these sites where they do not harm the ecological value of the site.

This document provides general property and acquisition information, a description of existing site conditions, a chronology of recent events and management actions, and a list of management objectives and recommendations for Tolt River Natural Area. These site management guidelines were developed using guidance established in the King County Ecological Lands Handbook (2003).

Part 1. General Property Information

The Tolt River Natural Area begins approximately two miles east of the City of Carnation in unincorporated King County, and extends approximately 3 miles upriver on the Tolt River. The site consists of several parcels that border the Tolt River over a discontinuous three and a half mile stretch, from river mile (RM) 2.1 to RM 5.5 and lies within the Tolt River's 100-year floodplain (King County Department of Parks, Planning and Resources, 1990). The Tolt River Natural Area provides valuable habitat for spawning salmonids and contains largely mature deciduous forest cover along the river's edge. A portion of the natural area on the right bank of the Tolt River is confined by a levee system.

The Tolt River Natural Area is currently made up of twelve parcels totaling nearly 240-acres located on the right and left banks of the Tolt River and adjacent to privately owned lands. The Tolt River Natural Area is divided into five distinct sections including 1) a 16.7-acre forested block in the southwest portion of the natural area on the right bank of the Tolt River; 2) an 18-acre northern section comprised of riparian forest and gravel bars encompassing both the right and left banks and a prominent bend in the Tolt River; 3) several forested parcels totaling nearly 10-acres that extend from the left bank of the Tolt River; 4) a 67-acre forested parcel about $\frac{1}{2}$ to $\frac{3}{4}$ of a mile upstream on the left bank; and 5) a 129-acre forested parcel $\frac{3}{4}$ of a mile further up stream, also on the left bank. The King County Department of Natural Resources and Parks is negotiating the acquisition of additional parcels which lie adjacent to parts of the Tolt River Natural Area.

The Tolt River Natural Area is zoned RA-10 in accordance with the 2000 King County Comprehensive Plan. The zoning designation refers to the rural land use where the predominant lot pattern is 10 acres or greater but less than 20 acres in size. The purpose of the rural area zone (RA) is to provide for long-term rural character and to minimize land use conflicts with nearby agricultural or forest production districts or mineral extraction sites (King County Code 21A.04.060). These goals are accomplished by: 1) limiting residential development; 2) allowing small scale farming and forestry activities and tourism and recreational uses compatible with rural character; 3) increasing required setbacks to minimize conflicts with agriculture, forest or mineral zones; and 4) requiring tracks of cluster development designated as permanent open space.

Two properties passively managed by King County's Flood Hazard Reduction Services also lie adjacent to the Tolt River Natural Area (parcels #1425079013 and #1425079058). These parcels were originally obtained by King County through tax foreclosure and acquired by the Snoqualmie Watershed team to protect the natural processes in the Tolt River floodplain (K. Anderson, Personal Comm., 2004).

The Tolt River Natural Area lies in the Snoqualmie Basin. Land use in the Upper Snoqualmie Basin above Snoqualmie Falls is varied. Much of the upper watershed area contains National Forest lands and land that is primarily managed for timber by private companies. A majority of the watershed has been logged since the turn of the 20th century with little or no old growth forest remaining except in those areas

set aside as reserves such as the Alpine Lakes Wilderness. As King County continues to grow, several cities in the upper basin will have expanding commercial and residential development.

The lower Snoqualmie River Basin below Snoqualmie Falls is largely dominated by agricultural land use (70.4%) and rural residential land use (22.2%) (Solomon and Boles, 2002). The valley floodplain passes through the communities of Fall City, Carnation and Duvall. While these communities have historically supported rural land use activities such as forestry and agriculture, both urban land use and population are increasing. Between 1980 and 2000, the population in the Snoqualmie Basin nearly doubled, from just under 20,000 to approximately 40,000 residents. The Puget Sound Regional Council predicts that the population will further increase to over 70,000 residents by 2020 (King County Annual Growth Report, 2001). Private timber companies also intensively harvest trees in the Tolt River, Raging River, Griffin Creek and Tokul Creek watersheds (King County Department of Natural Resources, 2001).

In the Tolt sub-basin, the lower Tolt River below RM 6, just south of the rural community of Carnation, is characterized by rural residential and agricultural land use. In the upper Tolt sub-basin, land is characterized primarily by forest lands, some of which are harvested by private timber companies and some of which are administered by the City of Seattle for water and hydroelectric supplies.

Table 1. Tolt River Natural Area General Information.

Best Available Address	353 rd Avenue NE and Tolt River Road NE, Carnation
Thomas Guide Map Location	Page 569
Legal Description	Sections 1, 11 and 14, Township 24 N, Range 7 E
Acreage	240 acres
Drainage Basin	Tolt River
WRIA	7
Council District	3
King County Sensitive Areas	100-year floodplain, wetlands, erosion and seismic hazards.

Table 2. Tolt River Natural Area Parcel Information.

Parcel Number	Acreage*	Recording Number	Purchase Date	Ownership type/price	Previous Names	Zoning	Funding Sources
1425079010	18.02	20020725002223	7/24/2002	Owned in Fee \$110,000	Fry	RA-10	ESA Early Action-Tolt / Snoqualmie (Combination Salmon Recovery Funding Board Grant; King Conservation District Grant and Conservation Futures)
1425079052	7.50	20021212001814	12/12/2002	Owned in Fee \$104,500	Parcel 20 Welk	RA-10	
1425079040	1.49	20020930004048	9/30/2002	Owned in Fee \$16,500	Johnson	RA-10	
1425079036	.88	20020628000898	6/28/2002	Owned in Fee \$10,000	Looney	RA-10	

Parcel Number	Acreage*	Recording Number	Purchase Date	Ownership type/price	Previous Names	Zoning	Funding Sources
1425079044	1.58	20031010001241	10/16/2003	Owned in Fee \$20,000	Schmitt	RA-10	ESA Early Action-Tolt / Snoqualmie Salmon Recovery Funding Board Grant
1425079032	1.59	200308190012189	8/19/2003	Owned in Fee \$20,000	Roberson	RA-10	ESA Early Action-Tolt / Snoqualmie Salmon Recovery Funding Board Grant
1425079033	1.20	200331231000336	12/31/2003	Owned in Fee \$20,000	Myxter	RA-10	ESA Early Action-Tolt / Snoqualmie (Combination Salmon Recovery Funding Board Grant; King Conservation District Grant and Conservation Futures)
1425079031	1.56	20031027000767	10/20/2003	Owned in Fee \$20,000	Carlson	RA-10	
1425079042	1.59	20040114001712	01/14/2004	Owned in Fee \$20,000	Wall	RA-10	

Parcel Number	Acreage*	Recording Number	Purchase Date	Ownership type/price	Previous Names	Zoning	Funding Sources
1425079050	9.23	19991222001463	12/22/1999	Owned in Fee \$55,000	Coley	RA-10	ESA early action - Snoqualmie (Federal government direct appropriation for salmon recovery efforts. administered by Governor's Salmon Recovery Office)
1125079041 ¹	.6	20060317002434	3/22/2006	Owned in fee \$20,000	Plasch	RA-10	Conservation Futures
1125079013	67	20042124002391	12/14/2004	Owned in fee Part of Snoqualmie Tree Farm deal	Snoqualmie Tree Farm	RA-10	Conservation Futures Bond
0125079001	129	20042124002391	12/14/2004	Owned in fee Part of Snoqualmie Tree Farm deal	Snoqualmie Tree Farm	FPD	Conservation Futures Bond

*Acreage from King County Assessor's data.

Part 2. Acquisition, Funding Source and Deed Restrictions

The parcels that make up the Tolt River Natural Area were purchased in phases to protect the area's remaining high quality salmon habitat, specifically chinook winter rearing and juvenile habitat.

The acquisition actions commenced in early 1999 when the Snohomish Basin Salmon Recovery Technical Committee recommended that salmon recovery funds be used to protect connected, side channel habitats that are highly productive spawning and rearing areas for a variety of salmonids (King County Department of Natural Resources, 2000). After reviewing the most significant potential spawning areas in the Snoqualmie/Skykomish watershed, the Tolt River channel migration reach and the parcels that make up the Tolt River Natural Area were identified as priority sites.

The Tolt River Natural Area and the parcels that currently make it up were acquired between 1999 and 2003 as Endangered Species Act (ESA) early action - Snoqualmie / Tolt. In addition, King County is actively trying to acquire additional parcels in the vicinity of the Tolt River channel migration reach to create an even more contiguous and intact Tolt River Natural Area.

A majority of the parcels that make up the Tolt River Natural Area were purchased with a combination of funding sources collectively known as ESA early action. These funding sources include Salmon

¹ This parcel was acquired after the original draft of this SMG was written. As such it is not referenced in the text of the document. It is however shown on Figures 1- 3. The parcel is the first of many that King County is pursuing for acquisition as part of the San Souci reach project.

Recovery Funding Board Grants, King Conservation District Grants and King County Conservation Futures monies. Because the grant funding was combined, the exact amount allocated from each funding source per parcel is unknown. The one exception is the Coley parcel, which was purchased with federal salmon recovery appropriations administered by the Governor's Salmon Recovery Office. The two northern parcels (1125079013 and 0125079001) were purchased as part of the larger development rights acquisition of the Snoqualmie Tree Farm from Hancock Timber Resource Group. The funds for this acquisition came from bonding against Conservation Futures funds. Below is a summary of each funding source.

- The Salmon Recovery Funding Board (SRFB) administers funds for salmon recovery. The mission of the SRFB is to support salmon recovery by funding habitat protection and restoration projects and related programs and activities that produce sustainable and measurable benefits for fish and their habitat. SRFB salmon recovery projects may include acquisition; in-stream passage or diversion; in-stream, riparian, upland, or estuarine habitat actions; or assessments and studies. The projects funded by SRFB grants are intended to maintain habitat value, integrity and functionality over time. Lands acquired in fee with SRFB assistance must be dedicated to habitat conservation, outdoor recreation or salmon recovery uses in perpetuity. This is done through a recorded Deed of Right to Use Land for Habitat Conservation, Salmon Recovery, or Outdoor Recreation Purposes. This deed conveys property interests to the public forever. Natural resources and facilities purchased or assisted with SRFB funds cannot be converted to uses other than those for which the funds were originally approved in accordance with WAC 420-12.
- King County Conservation Futures monies are generated by revenues from the King County Conservation Futures Tax levy (CFT). The levy is addressed in King County Code 26.12, stating that "It shall be the goal of the county to maintain, preserve, conserve, and otherwise continue in existence adequate open space lands and to achieve an equitable geographic distribution of funds from conservation futures over the long-term." It also states that there should be "demonstrable regional visibility, use, ecological, cultural, historical or other natural resource significance in CFT funded projects." King County Ordinance 10750 (March 8, 1993) authorized a \$60,000,000 bond issuance against future CFT levy revenues to fund a CFT acquisition program called the Conservation Futures 1993 Bond Acquisition Program.

Conservation Futures acquisition criteria include: wildlife, salmonid, or rare plant habitat value; scenic resource, community separator, greenbelt, or general park and open space value; or historic and cultural resources. Additional consideration is given to passive recreation opportunity, interpretive opportunity, threat of loss, complexity of acquisition, public-private partnership, regional significance, relationship of proposed acquisition to existing parks, trails, or greenway systems or plans, and short-term and long-term stewardship commitment at the site (King County Code 26.12.025).

Acquisitions made with Conservation Futures funds are to be used for low-impact, passive-use recreation. Motorized use is limited to parking/staging/maintenance areas. "Non-vegetative impervious surfaces" should cover less than 15% of the site. Conservation futures interests shall not be transferred except with agreement that land interests shall be preserved in accordance with the intent and language of RCW 84.34.230; uses of lands shall not be altered unless equivalent lands within the geographic jurisdiction are provided (King County Ordinance No 10750).

- King Conservation District Grants are allocated annually to support habitat protection and restoration projects, stewardship programs, and studies. The money comes from a countywide \$10 per parcel assessment that funds the activities of the King Conservation District as well as projects through other watershed forums in King County. Eligible projects must be consistent with state law authorizing Conservation Districts (RCW 89.08) and "Regional Funding Principles" adopted by the King County Regional Water Quality Committee. These principles focus on projects that have a regional benefit or interest including:

- Protection of key parcels of land for fish habitat
- Habitat restoration that enhances ecologically significant fish runs
- Regionally coordinated monitoring and evaluation of fish habitat
- Watershed protection support services, such as coordinated monitoring and education
- Home buyouts in flood hazard areas where there is a high risk to public safety and there are other regional benefits in terms of habitat protection, open space or recreation

The acquisition of real property is permitted for purchase of properties or easements that will protect key features for fish and wildlife habitat and water quality protection. Funds are not to be used for active recreation facilities.

- The Governor's Salmon Recovery Office distributes federal appropriations for early action salmon recovery efforts. King County was granted the funds for the acquisition of lands essential for the protection of listed chinook salmon. No other conditions are known to accompany the funding source (K. Anderson, Personal Comm., 2003).

Part 3. Ecological Resources

This section describes the natural resources and ecological processes present at the Tolt River Natural Area. This section describes existing conditions; further analysis is provided in Part 6 below.

Topography and Soils

The topography of the Tolt River Natural Area varies substantially among the various segments. Segments one through three are predominantly flat with some localized gradients and lie within the Tolt River's 100-year floodplain. The maximum elevation is 145 feet above sea level and the minimum is approximately 125 feet above sea level. Segments 4 and 5 rise steeply from the left river bank to upland forest elevations of 320 and 600 feet respectively.

The soil survey, King County Area, Washington maps soils within segments 1-3 as riverwash and Pilchuck loamy fine sand (Snyder et al, 1973). Pilchuck is a level drained soil formed in alluvium, on low stream terraces and under cover of conifers and hardwoods. The hazard of erosion and deposition by stream overflow on these soils is moderate to severe. Riverwash consists of areas of sand, gravel and stones along channels of larger streams with frequent erosion and deposition.

Segments 4 and 5 consist of several soil types including Pilchuck, Bellingham, Alderwood-Kitsap, Rober, Snoqualmie, Barneston, and Tokul-Pastik. Bellingham is a loam found in depressions in glacial till plains and drainageways. It is poorly drained, and the major tree species is red alder. The Alderwood-Kitsap complex is a gravelly, sandy loam found on hillsides covered with a combination of Douglas Fir and red alder. Rober is a brown, silty loam found on moderately well-drained terraces. The forest comprises Douglas-fir western hemlock and red alder. Snoqualmie soils are found on low river terraces and are composed of very dark gray sand. Forest on this soil type is also composed of Douglas Fir, western hemlock and red alder. Barneston is an excessively drained loam overlying an extremely gravelly sand. It is also found on terraces covered with Douglas Fir and red alder. Finally, Tokul-Pastik is a brown, gravelly loam found in foothills and terraced side-slopes and host to Douglas Fir, western hemlock and red alder.

Much of the Tolt River Natural Area is recognized as a seismic and erosion hazard according to the King County Sensitive Areas Ordinance, King County Code Chapter 21.54 (King County Department of Parks, Planning and Resources, 1990). Part of segment 4 is considered a landslide hazard.

Hydrology and Morphology in the Lower Tolt River Reach

The Snoqualmie River originates in the Cascade Mountains and flows a total of 85 miles to the confluence with the Skykomish River. The Snoqualmie River watershed comprises 692 square miles and constitutes just over one-third of the Snohomish River Basin (Watershed Resource Inventory Area [WRIA] 7). The upper basin above Snoqualmie Falls has three main tributaries, the Middle, North and South Forks of the Snoqualmie River and is characterized by moderate to steep channel gradients and broad river channels. In the lower basin below Snoqualmie Falls, the river follows a strongly meandering course through the lower Snoqualmie Valley. A system of levees and revetments has fundamentally altered the dynamic flooding processes of the Snoqualmie River in terms of its in-channel and riparian habitat, sediment load, channel migration and interaction with its floodplain.

The Tolt River is a tributary of the Snoqualmie River (RM 24.6) near the city of Carnation. The Tolt River sub-basin is approximately 97 square miles at the mouth with its headwaters at the crest of the Cascades and drops more than 3,000 ft in elevation from crest to mouth (Parametrix, 2001). The Tolt River intersects the broader Snoqualmie Valley at RM 2. The Tolt River has two main branches - the North and South Forks - with their confluence at RM 9. There are approximately 30 river miles from the mouth of the Tolt River to the headwaters of either fork (Parametrix, 2001). The South Fork of the Tolt River contains a reservoir and dam, built in 1963 by the City of Seattle, that provides 30% of Seattle's water supply and about 1% of Seattle's electrical capacity (City of Seattle, 2003).

Continuous levees confine the lower Tolt River (below RM 2) along both banks. The levees provide protection against erosion and flood protection from moderate discharges. However, the levees fail to provide flood protection to contain extreme flood events. The levees on the lower Tolt have also altered flow dynamics and may adversely affect the quality and quantity of salmonid habitat (Parametrix, 2003). Historic maps and photos show a more complex, sinuous channel than exists in the currently channelized lower Tolt River reach where channel complexity has been greatly reduced, and side channels have been disconnected by levees (Parametrix, 2003).

Upstream of the levee constricted area (above RM 6) and in close proximity to the Tolt River Natural Area, greater channel complexity exists, resulting in the persistence of floodplain side channels and the regular recruitment of large woody debris (Parametrix, 2003). As a consequence, a large logjam is currently positioned in the Tolt River adjacent to section 3. In addition, the Edenholme side channel flows just outside section 3.

According to the Tolt Floodplain Reconnection Final Report the 2-year peak flow in the Tolt River is 7,900 cfs and the 100-year event is 22,000 cfs (Parametrix, 2003). The South Fork of the Tolt River reservoir has resulted in a reduction of lower Tolt River flood flow magnitude of about 30% (Parametrix, 2003).

Wetlands

The Tolt River Natural Area contains portions of one inventoried wetland, 13b, which stretches along the natural area's southeastern border. The "b" indicates that the wetlands have been mapped in the wetland inventory but the location has not been verified in the field. The wetland is identified on the U.S. Fish and Wildlife Service's National Wetland Inventory (King County Department of Parks, Planning and Resources, 1990). The palustrine wetland is approximately nine acres in total size although only about one acre of the wetland itself is contained within the Tolt River Natural Area. The remaining part of the wetland lies adjacent to the site. Wetland 13b is likely the remnants of the old Tolt River stream channel. The wetland is temporarily flooded and primarily forested although smaller amounts of scrub-shrub vegetation are present (U.S. Fish and Wildlife Service, 2003).

Two small intermittent streams that are located on the hillside directly north of the Tolt River Natural Area and travel under Tolt River Road NE likely provide the hydrologic input to the wetland. The wetland has seasonal flow and terminates in the Tolt River approximately a half-mile west of the natural

area. No wetland delineation has been performed, and the wetlands have not been categorized under the new (2005) wetland classification system.

Fieldwork in 2003 recognized the existence of intermittent forested wetland “pockets” in section 2. It is possible that these pockets receive inputs when the Tolt River is at high flows and the Edenholme side channel is full.

Vegetation

The Tolt River Natural Area’s five distinct sections include a variety of landscapes including upland forests, forested riparian areas and substantial gravel bars. Approximately 70% of sections 1-3 are forested. Sections 4 and 5 are entirely forested.

Section 1 is characterized by upland and riparian forest as well as a substantial gravel bar. The upland forest is predominantly second growth and contains a diversity of tree species. The dominant vegetation consists of deciduous species including big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and black cottonwood (*Populus trichocarpa*). The ages of the trees vary, averaging between 30–50 years. However, some of the cottonwoods are extremely large and may be well over 100 years old. A few scattered western red cedars (*Thuja plicata*) are also present. The understory consists of Himalayan blackberry (*Rubus discolor*), salmonberry (*Rubus spectabilis*), snowberry (*Symphoricarpos albus*) and, to a lesser extent, reed canary grass (*Phalaris arundinacea*). Along the levee in the southwest portion of the site, the primarily riparian forest vegetation consists of 10–20 year old red alder, big leaf maple and willow (*Salix spp.*). The understory is totally covered with Himalayan blackberry with a lesser component of reed canary grass, butterfly bush (*Buddleia spp.*) and snowberry. The gravel bar just south of the levee is made up of predominantly butterfly bush (70%) with lesser amounts of black cottonwood (20%) and willow (10%).

Section 2 is comprised of mature mixed deciduous forest along the Tolt River, a large gravel bar and some upland forest. The mature mixed deciduous forest is located on the left bank. The dominant vegetation consists of black cottonwood and big leaf maple. In these sections the dominant understory vegetation consists of salmonberry, snowberry, Indian plum, vine maple, cascara and sword fern. Several patches of coniferous forest species are scattered throughout, with mature Sitka spruce, western hemlock (*Tsuga heterophylla*) and western red cedars present. These coniferous patches contain an understory of devils club, salmonberry, red-twigged dogwood and sword fern. The vegetation adjacent to the Edenholme side channel contains mostly even aged buffer of young deciduous species including red alder, cottonwoods and big leaf maple, and an understory of cascara, salmonberry and vine maples. The gravel bar is located on the right bank of the northern section of the Tolt River Natural Area and contains about 90% butterfly bush and 10% willow and cottonwood, all approximately 6 feet in height.

A small upland forest component that was recently semi-cleared as a home site is also part of section 2 located just off of Tolt River Road SE and adjacent to the Tolt River levee. This upland area contains mostly mature vegetation consisting of a few large western red cedars, big leaf maples and black cottonwoods with an understory of sword fern, snowberry, thimbleberry, salmonberry, vine maple and Indian plum.

Section 3 contains riparian forest. The riparian section is primarily deciduous with red alder, black cottonwood and big leaf maple. The understory consists mainly of salmonberry, snowberry, and Indian plum. The mature coniferous stands are made up of large western red cedars, western hemlock and occasional Douglas Fir with an understory of sword fern, salmonberry, snowberry and Indian plum.

Due to the difficulty of accessing them, sections 4 and 5 have not been thoroughly analyzed in the field. That said, it would appear that the forest is mostly Douglas Fir roughly 20 years old.

Fish and Wildlife

The Snohomish River system sustains two genetically distinct runs of chinook salmon (*Oncorhynchus tshawytscha*); the fall run uses the Snoqualmie River and Tolt River systems (Washington State Department of Fisheries, 1993). The Snohomish River fall chinook salmon are listed as threatened under the federal ESA and are part of the larger Puget Sound chinook salmon evolutionary significant unit (Washington Department of Fisheries, 1993). Adults generally start to enter the Snoqualmie River and Tolt River systems in August and the spawning period lasts through October. The Washington State Salmon and Steelhead Stock Assessment (1993) describes the stock as native with wild production.

The Tolt River is the largest tributary to the Snoqualmie River that is accessible to anadromous salmon (Snohomish Basin Salmon Recovery Forum, 2001). The Tolt River provides high quality spawning habitat for nearly one fifth of the chinook salmon that return to the Snoqualmie River watershed to spawn. Another 20% of chinook salmon spawning occurs in the Snoqualmie River bars immediately below the Tolt River mouth. The gravel produced by the Tolt River provides the only gravel spawning area in the lower 30 miles of the Snoqualmie River (between RM 25 and RM 22) and creates high quality salmon habitat in this area. Gravel in this key salmon spawning reach is entirely supplied by the Tolt River.

In recent years an average of 500 chinook spawners have used the lower Tolt River and 658 chinook spawned in the Snoqualmie River below the Tolt River mouth in 2001 (Parametrix, 2003). Winter run steelhead trout, as well as pink and chum salmon, also heavily utilize these Snoqualmie River gravel bars.

The Tolt River Natural Area is included in the chinook spawning “core area” by the King County Department of Natural Resources and Parks (King County Department of Natural Resources, 2001). A core area is defined as part of the watershed that directly supports high levels of salmonid use for one or more of the four basic functions: 1) spawning, 2) juvenile rearing and outmigration, 3) adult migration and holding, and 4) refuge from disturbance. To sustain healthy populations of chinook salmon a watershed needs to provide habitat for these basic functions.

Likewise, the Tolt River Natural Area has been identified as part of a “focus area” in the Snohomish River Basin Chinook Salmon Near Term Action Agenda (2001). Focus areas are regarded as important links to the recovery of chinook salmon evolutionarily significant units and are determined from biological data on the level of habitat use. The Tolt River Natural Area lies within Focus Area five, a stretch of the lower Tolt River and South Fork of the Tolt River up to RM 1.6 and the Tolt-Snoqualmie River confluence downstream to about one mile below the Carnation Farms Road Bridge (Snohomish Basin Salmon Recovery Forum, 2001).

The Snohomish River Basin Salmonid Habitat Conditions Review (2002) evaluated the Lower Tolt River habitat conditions (RM 8.4 to mainstem Snoqualmie RM 23.9) in the vicinity of the Tolt River Natural Area reach. The review indicates that fish passage and water quality are intact, while the sediment condition, hydrology and floodplain connectivity are degraded. A data gap due to the lack of quantitative data exists in the review’s assessment of the Lower Tolt River’s wetlands/riparian zone and shoreline vegetation/large woody debris.

The Tolt River corridor at the Tolt River Natural Area is identified as a wildlife habitat corridor in the King County Comprehensive Plan (2004). The existence of several habitat types, including wetlands, forest and riparian, provides high quality habitat for a variety of resident and migratory bird species. Local residents have observed bald eagles although they are not known to nest or winter roost on the site. Bald eagles are listed as threatened under the federal ESA.

The Tolt River Natural Area offers significant habitat for a variety of mammalian wildlife. Deer, black bear (scat has been observed near the adjacent bed & breakfast) and cougar likely inhabit portions of the site, and beaver activity is evident in the wetlands. Raccoons, river otter, muskrat and mink are believed to frequent the river’s edge. Small mammals such as shrews, mice, voles, squirrels and weasels most likely are found on site.

A wide variety of amphibians and reptiles is believed to inhabit the wetland areas. However, no inventory has been conducted.

Part 4. Site Use and Infrastructure

This section describes public use, access points, and site infrastructure such as trails and roads at the Tolt River Natural Area.

Public Use

Public use on a majority of the Tolt River Natural Area is minimal since it was previously private land and therefore has little history of regular public use. In addition, the site's limited access, lack of formal trails, and general undeveloped character discourage recreation. However, several portions of the site do get limited amounts of visitation.

Most public use occurs, primarily in the summer months, directly off of Tolt River Road NE where there is an unofficial primitive parking area/pull off. The unofficial parking area/pull off is adjacent to the Tolt River and offers the public recreational opportunities such as nature observation, boating, fishing and swimming. From the parking area/pull off, visitors walk north along the levee in order to access a gravel bar that is part of the Tolt River Natural Area. The gravel bar, which is directly across from the large logjam, is used as a swimming hole and often contains small hand-made gravel pools. It is expected that some visitors walk south as well onto neighboring private property. Visitors are likely unaware that the natural area is public land. The parking area/pull off normally contains small amounts of litter and debris.

Moderate use also occurs in the southwest portion of the Tolt River Natural Area where trails started by the previous owner still exist. The extensive trail system, which continues to be maintained by neighboring landowners, is mowed regularly and brushed. Visitation is almost exclusively by adjacent landowners and guests of the bed and breakfast that borders the Tolt River Natural Area. The trails terminate at two different locations at the Tolt River. Some four wheeler use does occur on the site.

Sections 4 and 5 receive very little public use, if any, as they are very difficult to access.

Access

Public access to the Tolt River Natural Area is limited. Essentially, the only visitor access point is via the unofficial primitive parking area/pull off adjacent to Tolt River Road NE. There is room for approximately ten to twelve vehicles. To access the Tolt River Natural Area visitors normally walk down the levee to the large gravel bar.

A less conspicuous access point, which likely receives use from adjacent landowners only, is an unimproved road off of Lake Langlois Road NE. This road provides the best vehicular and maintenance access to the Tolt River Natural Area's parcels on the left bank of the Tolt River.

A third access point provides King County staff with access to the southwest portion of the natural area and is not for public use. This access point is a driveway off of Tolt River Road SE.

The only access to sections 4 and 5 is through the Snoqualmie Tree Farm, and this access is regulated by Hancock Timber Resource Group. While permission may be granted under certain circumstances, the difficulty of reaching the Tolt Natural Area through the Tree Farm limits the number of people who access these parts of the site.

Trails and Roads

Tolt River Natural Area offers no official King County sanctioned trails, although adjacent property owners maintain a network of trails throughout the southwest portion of the property. Maintenance of these trails seems to include frequent mowing and brushing. The density of the trails is high as they

weave through deciduous forest and lead to viewpoints on the Tolt River. The trails are used almost exclusively by nearby residents and visitors to the adjoining bed and breakfast.

The Tolt River Natural area contains one unimproved road off of Lake Langlois Road NE on the left bank of the Tolt River, which traverses the eastern edge of the natural area.

King County Stewardship Activities

Ongoing maintenance and stewardship of the Tolt River Natural Area is provided by the King County Parks Resource Program staff and documented in the annual Site Maintenance Plan (SMP). The SMP documents on-site tasks including but not limited to: site inventory, natural area monitoring, invasive / non-native plant removal, conflict resolution and park inspections.

An enhancement project has been proposed for the small upland forest component that was recently semi-cleared as a home site and is part of section 2. The project, known as the Tolt River Underplant Planting Plan, is to be funded through Puget Sound Energy tree mitigation program. According to the plan, 34 western red cedars and cascara will be planted.²

Flood Reduction and Floodplain Reconnection Activities

Historically, the Tolt River's channel migration was pronounced as the river channel spread across the entire 1500-foot width of the floodplain. As a result, relatively frequent floodplain migration has occurred. Over time, as the City of Carnation expanded in the lower Tolt River and construction of private homes and roads increased upstream, damage from the Tolt River's floodwaters increased. In response, in the 1960's and 1970's an aggressive flood control program was established in which large-scale levee construction, logjam removal and dredging commenced. The result is complete confinement of the final two-mile stretch of the Tolt River by levees and consistent dredging of the river bed. In the vicinity of the Tolt River Natural Area, the Edenholme levee was constructed on the right bank of the Tolt River to protect several homes.

In response to the frequent flooding, additional projects have been proposed in the vicinity of the natural area to limit flood damages. The King County Flood Hazard Reduction Plan (1993) identifies two potential projects: 1) Tolt River project (#209) which calls for improving the existing levee to reduce the risk of channel migration and 2) Tolt River project (#210) which calls for elevating the existing Tolt River Road NE and relocating as many as thirteen individual buildings. However, the plan acknowledges that the historic river channel essentially flows onto currently occupied properties and the likelihood of the river re-occupying this historic channel is likely if unchecked (King County Department of Natural Resources, 1993). A gravel removal study is also being conducted on the Tolt River to respond to community concerns that sediment accumulation is causing flooding (King County Department of Natural Resources and Parks, 2002). The listing of salmonid species as threatened under the federal ESA may affect the likelihood of implementation of the flood reduction projects because these projects could have adverse impacts on salmonids.

In response to the salmonid listing and as part of salmon recovery actions, the City of Seattle and King County are conducting a site analysis for a major habitat restoration opportunity on the lower Tolt River mainstem (below RM 2). The study evaluates the feasibility of moving levees away from the river channel with a goal of increasing the quality and quantity of spawning and rearing habitat in the study area (Parametrix, 2001). Ultimately, the project aims to restore function to the key spawning area that is now underutilized. Although this is unlikely to affect the Tolt River Natural Area, it is likely to aid salmon spawning success in the Tolt River.

² Following the initial draft of this plan, in 2004, this underplanting project was undertaken by Restoration Logistics. Restoration Logistics is responsible for maintaining the planting through 2007.

Part 5. Analysis

This section is intended to integrate site-specific information, public access considerations, and the larger landscape considerations described in the conservation principles section of the King County Ecological Lands Handbook (2003). This section presents the analysis from which site management recommendations will be made.

Information Gaps

In the absence of more complete site information, actions intended to restore parts of the ecosystems at the Tolt River Natural Area may inadvertently harm rare and critical species and habitats, or negatively affect the ecological processes at the site. To avoid this, King County ecologists completed a biological inventory in 2005 designed to gain a more thorough understanding of the terrestrial and aquatic species that use the area. The inventory was completed after the initial draft of the SMG and is thus attached as Appendix 1. The inventory does not include segments 4 and 5 of the Natural Area. Nonetheless, this information should be used when evaluating the full spectrum of ecological impacts from natural disturbances, proposed habitat restoration, public use activities and management recommendations.

Species of Concern

Documented evidence of two threatened species listed under the federal ESA, chinook salmon and bull trout, make habitat preservation and enhancement the central priorities at the Tolt River Natural Area. Activities that have the potential to harm these species should be undertaken cautiously, if at all. Habitat for salmon and bull trout should be protected and enhanced where necessary and appropriate. The intact forested riparian habitat of the Tolt River Natural Area contributes significantly to the protection of chinook salmon and bull trout.

Since chinook and bull trout protection is of critical importance, long-term sustainable management actions must foremost address ecological processes and structure on site.

Ecological Processes

Ecological processes must be maintained for ecosystems and habitats to be sustained. Current conservation theory suggests that where ecological processes are intact, systems are likely to recover – or be recovered – more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with the basic ecological processes the greater the severity and longevity of effects (King County, 2003). If systems are not functioning properly, management activities should focus on system-wide processes instead of the affected elements. Ultimately, management actions that do not consider the processes are less sustainable.

Bearing this concept in mind, management interventions within the Tolt River Natural Area should strive to maintain and restore basic ecological processes by maintaining a dynamic floodplain. To a certain extent, levee construction on the right bank of the Tolt River in the Tolt River Natural Area reach has constrained the river, depriving the floodplain of the free-flowing movement of water in the river channel. When a river is constrained, the sustaining natural processes, such as meandering and flooding are curtailed, thus diminishing riparian ecosystem complexity, diversity and function. Meandering, a natural response to sediment deposition promotes habitat complexity and the recruitment of large woody debris, both critical to creating habitat features (logjams, pools and side channels) necessary for healthy salmonid habitat. Flooding carries nutrient-rich silt and seeds of plants onto the floodplain for the natural regeneration of riparian forests. Without a functioning natural floodplain and the associated intact ecological processes associated with the natural floodplain conditions, restoration will be difficult.

Historically, the Tolt River's intact ecological processes were maintained by the complex and dynamic river conditions that resulted when the river was consistently migrating across the floodplain reach, which periodically produced new channels (due to channel avulsions and log-jams) and created wetted side

channels. Along the left bank of the Tolt River in the Tolt River Natural Area reach, ecological processes are marginally intact. This is primarily due to the absence of flood control features both upstream and on the left bank, which allows the river to meander in the river channel and occasionally flood. The presence of large woody debris and log-jams, side channels, and an intact riparian forest component on the left bank indicate that to some extent processes are still present. In contrast, the ecological processes on the right bank of the Tolt River in the Tolt River Natural Area reach are degraded, primarily due to the presence of the Edenholme levee which extends along the entire natural area. The levee protects several houses and Tolt River Road NE from flooding during high flow periods. However, the levees degrade the functionality of ecological processes by depriving the river of access to the floodplain and altering the character of the riparian area.

At the Tolt River Natural Area, there are several strategies to reconnect the main channel with its floodplain and hence enhance the ecological processes on site. These strategies, including levee removal and methods to increase overbank flooding on the degraded right bank, are constrained by the existence of private property, homes and roads. On the left bank, although ecological processes are marginally intact, opportunities for enhancement exist. For example, an enhancement project that decommissions the unimproved road off of Lake Langlois Road NE and removes the culverts would improve hydrologic connectivity. While this enhancement initiative would improve ecological processes, it is not a high priority. The key to the Tolt River Natural Area's ecological processes is to maintain and preserve them in their current state. Therefore, the most beneficial management recommendation is to continue acquiring high priority lands within the Tolt River Natural Area reach for the protection and preservation of ecological processes.

Ecological Structure and Function

Although protecting and enhancing ecological processes is the top management priority, the length of time required to accomplish this makes it appropriate to restore structure as an interim measure.

A structurally diverse and functioning forested floodplain provides numerous ecological benefits such as shading the river, trapping sediment and detritus in the floodplain, preventing excessive erosion, providing diverse habitat, delivering large woody debris and creating a canopy that shades out noxious and invasive plant species. The Tolt River Natural Area offers opportunities for restoring the floodplain through native tree and shrub plantings as well as controlling noxious, invasive and non-native plant species.

There are several distinct locations within the Tolt River Natural Area that would likely benefit the most from efforts to enhance ecological structure and function at the site. An enhancement project in the southwest forested portion of the site, that would include tree plantings representing a mixture of coniferous and deciduous species, would be beneficial. Here the forest has been deprived of its natural floodplain conditions and therefore lacks adequate structure and function. Inherent in these tree plantings would be attempts to maintain and enhance structural complexity, plant diversity and multiple canopy layers in order to provide a variety of vegetative and physical features that would, in turn, provide a variety of niches for wildlife. Another component of the enhancement in this portion of the site would be to control the noxious, invasive and non-native weeds, particularly the infestation of Himalayan blackberry on the levee near the bed and breakfast.

Another location that could benefit from structural and functional enhancement measures is the small upland forest component that was recently semi-cleared as a home site and is part of section 2. The site is located just off of Tolt River Road SE and adjacent to the Tolt River levee. This upland forest component consists mainly of native vegetation but is very susceptible to invasive plant species due to its recent disturbance. A relatively small enhancement project consisting of several conifer and shrub plantings and done relatively soon would ensure that native vegetation continues to dominate this area by not giving potential in-roads to invasive plant species.

Several sections of the Tolt River Natural Area are also heavily infested with butterfly bush, which is on the King County Noxious Weed List (2002). The infestation is especially problematic on all the gravel bars that are part of the Tolt River Natural Area. Although it is important to address the butterfly bush infestation, this will need to be accomplished on a reach or watershed-wide scale in order to be effective. In addition, the high flows on the Tolt River will likely deluge the butterfly bush periodically, after which control measures may be more effective.

Without funding, little work on improving the structure and function of the sites will occur. Therefore, funding sources and grants must be acquired to initiate these important projects.

Monitoring

There are two types of monitoring: 1) monitoring of management actions to determine if they are succeeding in their objectives; and 2) monitoring the processes on lands where no management action is taking place to determine if the management action is needed (King County, 2003). Since natural and social systems are uncertain, dynamic and in a constant state of flux, monitoring information is used to adaptively manage the site.

While a long-term monitoring program for the Tolt River Natural Area would provide an early warning of ecological change on the site, it is not feasible at this time due to fiscal restraints. If future projects are initiated to enhance the ecological processes on site or if public use increases substantially, an appropriate monitoring framework should be administered. However, King County Department of Natural Resources and Parks staff should monitor public use and noticeable ecological impacts to the site as much as possible. Photographic evidence should be kept in order to visualize short and long-term changes.

Public Use

Aquatic and riparian habitats are especially vulnerable to recreational activities (Washington Department of Fish and Wildlife, 1997). Currently, the Tolt River Natural Area supports low numbers of visitors engaged in recreational activities such as nature observation, swimming, boating and fishing. Most visitation occurs on the western portion of the Tolt River Natural Area along the right bank of the Tolt River due to presence of the primitive parking area/pull off and proximity to adjacent landowners. Although there is a high density of trails in the southwest section of the natural area, these trails are used only by neighboring landowners and appear to have no adverse effects on the ecological resources. Likewise, the gravel bar that is accessed via the primitive parking lot/pull off, while receiving high use in the summer months, seemingly has no adverse effect on the ecological resources. Future public use of the Tolt River Natural Area may increase as the population of the region increases and the public becomes aware of the site.

It is ideal to keep public use confined to upland areas where possible and away from rare and sensitive areas. These riparian areas lack the capability to resist changes in environmental conditions and/or lack the resilience to recover from change. At this time there is no reason to install visitor infrastructure due to the lack of public access. Monitoring changes in public visitation, types of use and impacts on the ecological systems will alert land use managers to needed management adjustments.

There are several alternatives for dealing with the trail system maintained by the adjacent landowners. The first would be to contact the people who have maintained the trails and decide which trails to keep open. The density of trails is high and should be reduced. A loop trail has less impact on the landscape and can meet the needs of the adjacent landowners that make up the majority of users of the natural area. Other options are to leave all the trails as is and monitor them on a regular basis, or to close down all the trails and allow no public use. The best solution may be to negotiate with neighboring landowners to close off some of the unneeded or redundant trails and to maintain a loop trail.

Lastly, the parking area/pull off adjacent to Tolt River Road NE, should be inspected frequently for the presence of litter. Adjacent landowners may be able to help with this effort.

Part 6. Management Goals, Objectives, and Recommendations

The objectives and recommendations in this section are derived from the analysis in the previous section. Office of Rural and Resource Programs staff will revise the recommendations for the Tolt River Natural Area within five years, or more frequently when new information from site monitoring programs and other initiatives indicate a need for a change in management strategies.

Goals for Tolt River Natural Area

The King County Department of Natural Resources and Parks staff will strive to

- conserve and restore ecological value, and
- accommodate appropriate public use that does not harm the ecological resources on site.

The objectives and recommendations that follow are designed to support these goals where practicable. The corresponding matrix (Table 3) designates the King County Department of Natural Resources and Parks staff involved in implementing the specific recommendations.

Objective: Maintain and enhance dynamic floodplain

➤ *Recommendation: Continue acquisition of adjacent properties*

King County Department of Natural Resource and Parks should continue to actively pursue negotiations with landowners to acquire priority properties within this important reach of the Tolt River. In conjunction with the acquisitions, King County staff should continue to seek out funding sources such as King Conservation District and the Salmon Recovery Funding Board grants for acquisition of salmon habitat and restoration projects.

➤ *Recommendation: Control noxious, invasive and non-native plant species*

King County Department of Natural Resources and Parks staff should manage the noxious, invasive and non-native plant species that infest portions of the Tolt River Natural Area. These efforts will aid in the enhancement of the natural floodplain conditions and in restoring ecological structure to the site.

Priority for the control of noxious, invasive and non-native plant species should be given when control of specific weeds is required and where infestations are impacting sensitive areas. The removal and control of the large infestation of Himalayan blackberry on the levee in the southwestern portion of the property should be the first priority. If possible, the removal of the butterfly bush should be the second priority. Other noxious, invasive and non-native plant species should be controlled as needed or when resources are available.

Until native tree and shrub plantings are established which shade out unwanted plant species, various methods of control are possible. In some areas, cutting the plants where they are found and using weed fabric to cover infested areas is advisable. If necessary, staff should explore and implement alternative methods of control as part of an Integrated Pest Management program. After several years, successful tree plantings should begin to shade out noxious, invasive and non-native plant species.

➤ *Recommendation: Plant native trees and shrubs*

King County Department of Natural Resources and Parks staff should work to plant native trees and shrubs to facilitate the enhancement of the forested floodplain and begin to restore ecological structure to certain portions of the site. Staff should initiate opportunities such as volunteer tree planting events and soliciting donations of native tree and shrub starts.

The highest priority area for tree and shrub planting should be in the small upland forest component that was recently impacted for a home site and is also part of the northern portion of the Tolt River Natural Area. King County staff should strategically plant several large conifer species and shrubs immediately to thwart any invading plant species.

The second priority area is in the forested southwest portion of the site deprived of its natural floodplain conditions and therefore lacking adequate structure and function. King County staff should plant native trees and shrubs in priority areas that will contribute to the site's ecological structure and function. The plantings will provide numerous ecological benefits to the site such as helping to shade the river, trapping sediments and reducing erosion, delivering large woody debris, and creating a canopy that shades out noxious, invasive and non-native plant species.

King County staff should provide adequate protection for tree and shrub plantings until monitoring suggests that the trees will prosper without such protection measures. All plantings should be monitored often to estimate tree survival and health as well as to assess watering needs, disease, animal damage and competition.

➤ ***Recommendation: Seek funding sources and grants for enhancement projects***

The site's strategic location on the Tolt River and its important contribution to ecological processes and habitat structures for the productivity and spawning potential of chinook salmon make enhancing the ecological conditions essential.

To make this possible, King County Department of Natural Resources and Parks should actively seek funding sources and grants for enhancement projects. Staff should explore CIP projects, habitat restoration and salmon recovery grants and other available funding to support enhancement projects.

King County Department of Natural Resources and Parks staff should consider funding future long-term enhancement projects that seek to reestablish the ecological processes, structure and function of the site's floodplain. Particular enhancement projects may include (but are not limited to) the decommissioning of the unimproved road off of Lake Langlois Road NE, the planting of native trees and shrubs, and initiatives to control noxious, invasive and non-native plant species.

Objective: Allow levels of public use that do not impact ecological resources

➤ ***Recommendation: Implement preserve and protect measures***

Public use on the Tolt River Natural Area is essentially concentrated in the gravel bar areas on the river right side of sections 1-3 and in the forested southwest portions where unofficial trails are used primarily by adjacent landowners. The current public use is not impacting the ecological resources of the site.

King County Parks staff should recommend, install and maintain any necessary capital improvements to protect the site from inappropriate uses. This should include bollards, fences, signs and boundary markers.

King County Parks may want to install and maintain more visible signs near the parking lot/pull off area to discourage littering, although technically it may be in the road right of way and not on the Tolt River Natural Area proper.

King County Parks staff should address the high density of trails that have been installed by adjacent landowners in the southwest portion of the site. Informal negotiations should be initiated with these landowners to close down / stop maintaining the unnecessary trails and maintain a loop trail only. Landowners should also be aware that no motorized use of the trails is allowed. If necessary, signs should be installed to discourage inappropriate public use of the site.

➤ ***Recommendation: Monitor public use***

King County Parks staff should note and record changes in visitor numbers and types of public use activities at Tolt River Natural Area. Noticeable visitor impacts on the ecological values of the site should be recorded. This information should be reported annually to the King County Natural Resource Lands Program for updating and adapting site management guidelines.

Objective: Inform and educate adjacent landowners

➤ ***Recommendation: Meet with adjacent landowners***

King County Department of Natural Resources and Parks staff should contact adjacent landowners to inform them about the goals and purpose of the Tolt River Natural Area. Currently, there is limited understanding among adjacent landowners as to why King County is acquiring land in the Tolt River Basin. Several landowners have expressed distrust in King County stemming from past experiences with local flooding and levee maintenance activities. It would be beneficial to explain the goals of the Tolt River Natural Area to build trust and understanding.

In addition, adjacent landowners who are aware and informed about the purpose of the Tolt River Natural Area can better assist and support current and future stewardship, and also monitor the property.

Objective: Implement Site Management Guideline (SMG) recommendations

➤ ***Recommendation: Site Maintenance Plan (SMP) creation***

King County Parks staff should prepare a site maintenance plan for the Tolt River Natural Area that incorporates these site management guideline recommendations. King County Natural Resource Lands staff and the Snoqualmie River Basin Steward should collaborate on this effort.

➤ ***Recommendation: Coordinate implementation of Site Management Guideline (SMG) recommendations***

King County Natural Resource Lands staff should monitor the recommendations in the site management guidelines and coordinate with the various programs responsible for implementing these recommendations to facilitate their timely accomplishment.

King County Natural Resource Lands staff should coordinate with Snoqualmie River Basin Steward and King County Parks staff to revise the site management guidelines as needed.

Table 3. Matrix of Tolt River Natural Area Management Recommendations

Recommendations	Cost	Year	Park Resource Staff	Basin Steward	WRIA Project Coord.	CPOSA/ Contract	WEAT	FHRS	NRL staff
Priority One									
Continue acquisition of adjacent properties		2004 - 2006		X		X		X	

Implement preserve and protect measures		On-going	X						X
Meet with adjacent landowners		On-going	X	X				X	
Create site maintenance plan		Annual	X	X					X
Monitor public use		On-going	X						
Priority Two									
Coordinate implementation of site management guideline recommendations		On-going	X	X					X
Control noxious, invasive and non-native plant species		On-going	X	X		X			
Seek funding sources and grants for enhancement projects		On-going	X	X		X		X	X
Plant native trees and shrubs		N/A	X	X		X			

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Appendix 1

Tolt River Natural Area Biological Inventory and Ecological Assessment

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Tolt River Natural Area

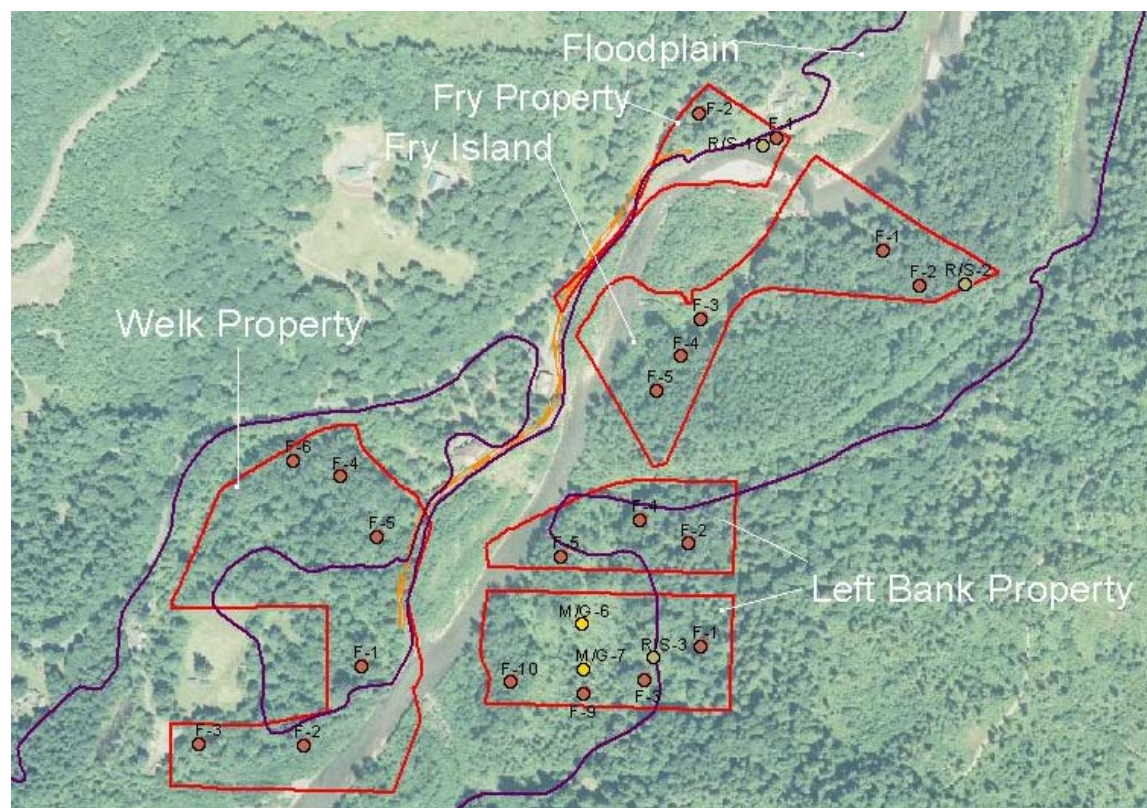
Biological Inventory and Ecological Assessment

The following report is based upon May 2004 data collected by a King County ecologist (Karen Fevold) and the Snoqualmie River basin steward (Kirk Anderson) with help by another King County ecologist (Kollin Higgins) as well as map and historic data collected in the office (by Fevold). The riparian forest communities and a tributary stream were examined during data collection.

Site Introduction

Tolt River Natural Area is currently composed of five properties between RM 2.4 and 3.0 on the north and south sides of the Tolt River and comprises a total of approximately 43 acres (Figure 1). The five properties are separated in space by some private inholdings as well as former river-bed, whose default land manager is Washington Department of Natural Resources. Land ownership is discussed further in the “Connectivity and Natural Boundaries” section below.

Figure 1. Properties comprising the Tolt River Natural Area. Areas inside red lines are current within the Natural Area. Purple line indicates floodplain. Orange lines indicate levees/revetments. Data collection key: F=Forest; R/S= Riparian/Stream. (scale: 1” = 0.13mi.)



In this report the properties are referred to by the previous owners' name (e.g., Welk or Fry property) or by the location (e.g., Left Bank property). Part of the Fry parcel is bounded to the north by the Tolt River and to the south by the Edenholm side channel; that portion of the Fry property is referred to as Fry Island. These five properties vary in shape and size as well as in the vegetative communities that occupy them (Table 1).

Table 1. Properties that comprise the Tolt River Natural Area at time of writing, December 2004.

Property	Size (acres)	Geometry	Land Cover (approximations)
Fry Island	10.68	irregular	100% vegetated
Fry Property (on right bank)	2.89	irregular	95% vegetated / 5% gravel-covered
Left Bank Property north of inholding	5.17	irregular	100% vegetated
Left Bank Property south of inholding	7.95	rectangular	98% vegetated / 2% former road/cabin
Welk Property	16.73	irregular	100% vegetated with some mowed trails

The Left Bank property is the most vegetatively patchy with coniferous areas set within a matrix of black cottonwood/bigleaf maple forest on an upper terrace, younger cottonwoods on the lower terrace, and a meadow area with reed canarygrass and some deciduous forest. This property also includes small stream. Fry Island property is a uniform stand of cottonwood and bigleaf maple; this area is difficult to access because no roads or trails lead to this part of the natural area. The Welk property is forested with big-leaf maple and black cottonwood. On this property the bigleaf maple constitutes a larger percentage of the canopy cover than the other patches and is also often the dominant tree in the canopy with black cottonwood subdominant. The vegetative communities are discussed below in the aquatic and terrestrial sections. Plant species observed on-site are listed in the Appendix.

Aquatic Community Types

The aquatic communities of the Tolt River Natural Area include the Tolt River and riparian forests, floodplains, side channels, wetlands, and tributary streams.

All of the properties in the Natural Area are adjacent to the river and completely within the historical floodplain. However, the northernmost part of the Fry property is not part of the current floodplain, and the secondary terraces of the Left Bank properties are not considered part of the floodplain (Figure 1). A meadow area is located within the floodplain, and although it is likely occasionally affected by the river flooding, it will be considered a terrestrial habitat and discussed in the Upland Community Types section.

Instream Habitat

Tolt River data were only taken adjacent to the northern Fry property because the large size and discharge of the Tolt River rendered data collection only possible along this margin. A levee constrains the westward movement of the river along most of the Natural Area.

The Tolt River is approximately 60 to 70 feet wide through the Natural Area and flows relatively straight and fast, with riffle habitats abundant throughout the site. Water depth was estimated to be 3 feet through this reach. The adjacent floodplain is approximately 1000 to 1500 feet wide. The river bend that occurs at the Fry property is the site of a large woody debris jam (Figure 2), and deep and large scour pools are associated with the jam. The key member of this debris jam is a 3-ft diameter Sitka spruce log with an attached root wad.

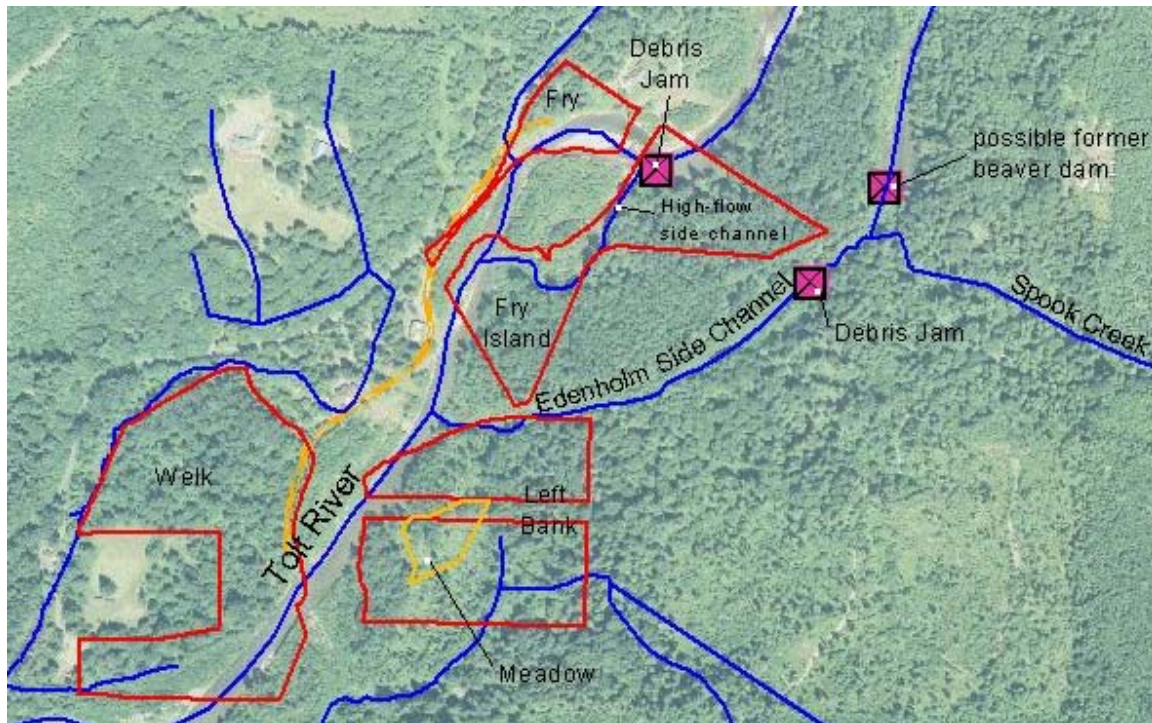
The large debris jam contributes to the river habitat diversity by providing large pool area for resting salmon and deflecting water around the cobble bar behind it. This deflection creates a refugia from high flow in the overflow channel behind the logjam.

Although the river is constrained by a levee on the left bank, a point bar, a mid-channel bar, and a side-channel are present and are a result of erosional and depositional activity of the river. Substrate in this area of the river is large cobble/small boulder, mostly 7-12" diameter. On the first of two field days a fine

layer of silt was deposited on the river substrate, and the water was slightly cloudy. The cause of this silt deposition is unknown.

Caddisfly, mayfly, and stonefly larvae were abundant, and juvenile salmonids were common and frequently seen in slow water along the margins of the river. Numerous northern rough-winged swallows were flying above the river at the logjam and used the wood in the debris jam for perching. A merganser spp. was seen in the river along the wood jam, and a spotted sandpiper and killdeer were sighted on the nearby cobble bars.

Figure 2. Tolt River Natural Area and immediate vicinity, including some natural features. Orange lines indicate levees. (scale: 1" = 0.14mi.)



Tributaries and Side Channels

Data were collected on the Edenholm side channel (R/S-2) and one tributary (R/S-3) in the Tolt River Natural Area. An additional side channel and tributary are also described below.

The Edenholm side channel flows along the southern edge of Fry Island and to the north of the Left Bank property. Historically, the Tolt River alters between its current location and this side channel, and it is possible it may return to this channel in the near future based upon the amount of flow currently present. Portions of King County's Fry Island property to the north and Left Bank to the south are adjacent to the channel (Figure 2). The channel is about 35 feet wide, straight, fast flowing, and approximately 3 feet deep. A second large debris jam is located in this side-channel (Figure 2). Multiple channels caused by this large debris jam were present at the northern end of the Fry Island property. The volume of the debris jam was large (approximately 50 feet by 40 feet) and was made up mostly of smaller diameter (6-12") deciduous intact trees, though numerous pieces are greater than 1 foot in diameter.

The substrate of the channel was examined at the stream margins and was primarily sand and silt with embedded 3-6" cobbles. Approximately 250 feet upstream of the property was what appeared to be a recently ruptured beaver dam and the apparent source of the fine sediment in the side-channel. In the 2002 aerial photograph (Figure 2) a large pond indicates the presence of a dam, and numerous beaver sticks and beaver stumps were found in the area during data collection. A large amount of sediment is present about

the dam site and the channel is now downcutting through this sediment wedge. Upstream from the former pond area, 2-4" diameter cobble and gravels were present and a former redd remained visible.

In the Edenholm side channel, caddisfly and stonefly larvae were common; however, no mayfly larvae were seen on cobbles embedded in silt in the channel. Salmonids were rarely seen in the channel margins.

The second side channel surveyed begins behind the large Tolt River debris jam of the Fry Island parcel and runs along the floodplain terrace (Figure 2). In a dry May when water flows were relatively low, water in this channel was only present in disconnected pools. During higher flows it is probable that this channel fills from surface or hyporheic flow and provides a refugia for salmonids from fast flows. These observations are consistent with Solomon and Boles (2004), who reported channel avulsions³ at RM 2.8.

A very small tributary crossing the Left Bank property was 2 feet wide and 3" deep. The channel was very low gradient, and slow moving shallow habitats were predominant, with no wood or large cobbles or boulders present to force pool formation. Fine to medium gravels were the dominant substrate.

Caddisflies, stoneflies, and mayflies were common in the stream. No fish were observed at the sampling site (R/S-3), though juvenile salmonids—likely cutthroat trout—were seen upstream of the sampling site at the access road crossing.

A tributary in an old main channel on the Welk property flows adjacent to the road. This feature appears to stay wetted throughout the year, though rate and amount of flow varies. This channel most likely also captures groundwater from the adjacent hillside and carries it to the Tolt River. Upon inspection at the end of summer 2004, the water was stagnant and the outlet to a pond along the channel was dry.

Riparian/Floodplain Forest

The riparian/floodplain communities in the Tolt River Natural Area include recently vegetated gravel bars as well as floodplain forest that is occasionally to rarely flooded by the Tolt River. "Forest" data were collected for 20 sites, which are marked with an F (e.g., F-2) on Figure 1. "Riparian" data were collected for 3 sites adjacent to water bodies, and these are indicated on Figure 1 with R/S symbols (e.g., R/S-3). The following discussion covers all the vegetation data collected for all these sites, although it is possible small patches of upland forest are mixed in with these floodplain communities.

Gravel bars in the Natural Area that have been colonized by riparian tree and shrub species represent a range of ages. All of the sites were dominated by red alder or black cottonwood, with willow spp., black cottonwood, or alder sub-dominant. Dominant shrub species were butterfly bush (non-native), red osier dogwood, willow, or thimbleberry. At all these sites red alder was the most common groundstory seedling present, though black cottonwood and bigleaf maple seedlings were also present. Ground story vegetation was sparse and dominated by grass spp. or creeping buttercup. This sparse understory may result from exposure or exceedingly well-drained soils. Western bleeding heart was present in the older, more closed canopy forests (50 percent canopy closure), and large-leaved avens and Suksdorf's mugwort were present at the site that had 10 percent canopy closure (site F-3 at Fry Island). Butterfly bush is a common invasive on the Tolt River and several vegetated gravel bars adjacent to the Natural Area properties are dominated by butterfly bush.

A few isolated patches of coniferous forest are present in the riparian areas of the Natural Area. On the Left Bank Property the canopy of two significant patches are dominated by either Douglas-fir or western hemlock, with western redcedar sub-dominant. Some of these conifers are relatively large diameter (>25"). Hemlock and Western redcedar seedlings and saplings are present in the understory of one of the sample sites. All sites currently support conifer regeneration.

Mature big-leaf maple and cottonwood are also present in the riparian areas. The dominant understory tree is vine-maple. Indian plum, salmonberry, and snowberry are common shrubs present. The ground

³ An avulsion is a channel migration process in which a river bend is detached from the main channel. This result is an oxbow.

story was dominated by sword fern, with lady fern sub-dominant. Some very large redcedar stumps with springboard notches are present. No nesting cavities are visible in the two snags on these sites. These snags were 10" in diameter and may make good nesting habitat for small cavity nesting species as the wood decays.

On the northern edge of the Welk property is a forest with a black cottonwood canopy and a dense single-species Sitka spruce understory. This forest was remarkable in the uniformity of the understory and the exclusion of understory shrubs and forbs. The groundstory consisted of a few first-year bigleaf maple seedlings and scattered mature vine maple, Indian plum, and sword fern. The ground itself was covered by cottonwood leaf litter. It is difficult to say whether the spring season was particularly favorable for bigleaf maple seedlings, or if a high occurrence of germination is normal and the seedlings are not surviving past the first year. Some English ivy was also present at this site.

The deciduous forests of these properties in Tolt floodplain are all dominated by black cottonwood. Bigleaf maple is present in the canopy and the understory and is also the co-dominant or sub-dominant species in these locations. Conifers were present throughout the predominantly deciduous forest.

The overall trajectory of the pioneering riparian forests in this reach would be to an alder-dominated community and then a cottonwood/ bigleaf maple forest similar to that present at sites farther removed from the river. Because these pioneering sites are close to the river, however, it is possible that they may never reach a mature deciduous stage, but instead, because of lateral migration by the river, be continually reset by floodplain disturbance.

At the Left Bank property, Douglas-fir was a frequent component, and the on other properties Western redcedar or Sitka spruce were present. Vine maple with varying amounts of salmonberry or snowberry was the usual understory in these forests. Cascara and Indian plum were often present in smaller numbers. Groundstory forbs were often not dense. Most of the area was covered by cottonwood leaf litter. Bigleaf maple seedlings and saplings were frequently present. Sword fern was often present in less dense groundstory, with a variety of other species such as thimbleberry, wild strawberry, bedstraw, bleeding heart, fringecup and reed canarygrass.

Ninety percent of the Fry Island property is lush black cottonwood/bigleaf maple forest. The canopy of this forest is mostly closed with few forest openings. The size of these trees was relatively uniform 15-22" DBH. Cedar saplings, 6-10" DBH, were present throughout the property.

Most (80 percent) of the Welk property is forested with big-leaf maple and black cottonwood. Bigleaf maple constitutes a larger percentage of the canopy cover on this property and is often the dominant tree in the canopy with black cottonwood subdominant. These dominant canopy trees (either the cottonwood or big-leaf maple) are mostly large diameter (20-26"). The groundstory is generally more diverse, though sword fern was still the most prevalent species. Sixteen to 20" DBH Sitka spruce and Western redcedar were present in small numbers throughout this forest. In addition, numerous Western redcedar saplings were also present. Numerous large cedar stumps are present on the property and provide nurse sites for red huckleberry colonization.

The lower floodplain terraces of the Left Bank property is also forested with 16-22" black cottonwoods. The understory of this forest varied, with bigleaf maple at site F-10 and Douglas-fir at site F-4 (Figure 1). The upper floodplain terrace is mostly mixed forest with coniferous forest patches. All of these trees are larger diameter of 18-20", with some trees as large as 30" DBH. Young Western redcedar, Western hemlock, and Douglas-fir are found throughout the riparian forest.

One or two white oak saplings, each 3-4 feet tall, were found on each of the properties. The seed source for these trees is unknown. It is unknown whether these are Washington's only native oak species, Oregon white oak (*Quercus garryana*), which is considered a priority species by Washington Department of Fish and Wildlife. However, its range in King County is generally limited to the western third of the county. According to Larson and Morgan (1998), "Oregon white oaks are generally restricted to lower elevations, drier areas, and areas with historically limited conifer competition. West of the Cascades, oaks

are found within the Western Hemlock Forest Zone and often occupy the narrow sub-zone between prairies and conifer forests.”

Wetlands

The National Wetlands Inventory has a large class-4 wetland mapped over much of this entire reach of the Tolt River. However, wetlands do not exist where they are mapped in this inventory. The King County wetlands inventory is correct not to have this entire large area mapped as wetland, though smaller wetlands may occur within the area.

No standardized protocols were used to collect wetland data; however, the small tributary that runs off of the terrace from the east in the Left Bank property spreads out and creates a wetland that was bounded to the west by the terrace wall and to the east by a rise in the topography. The wet area was 30-50 feet long in early May, and very likely dries up by mid-summer.

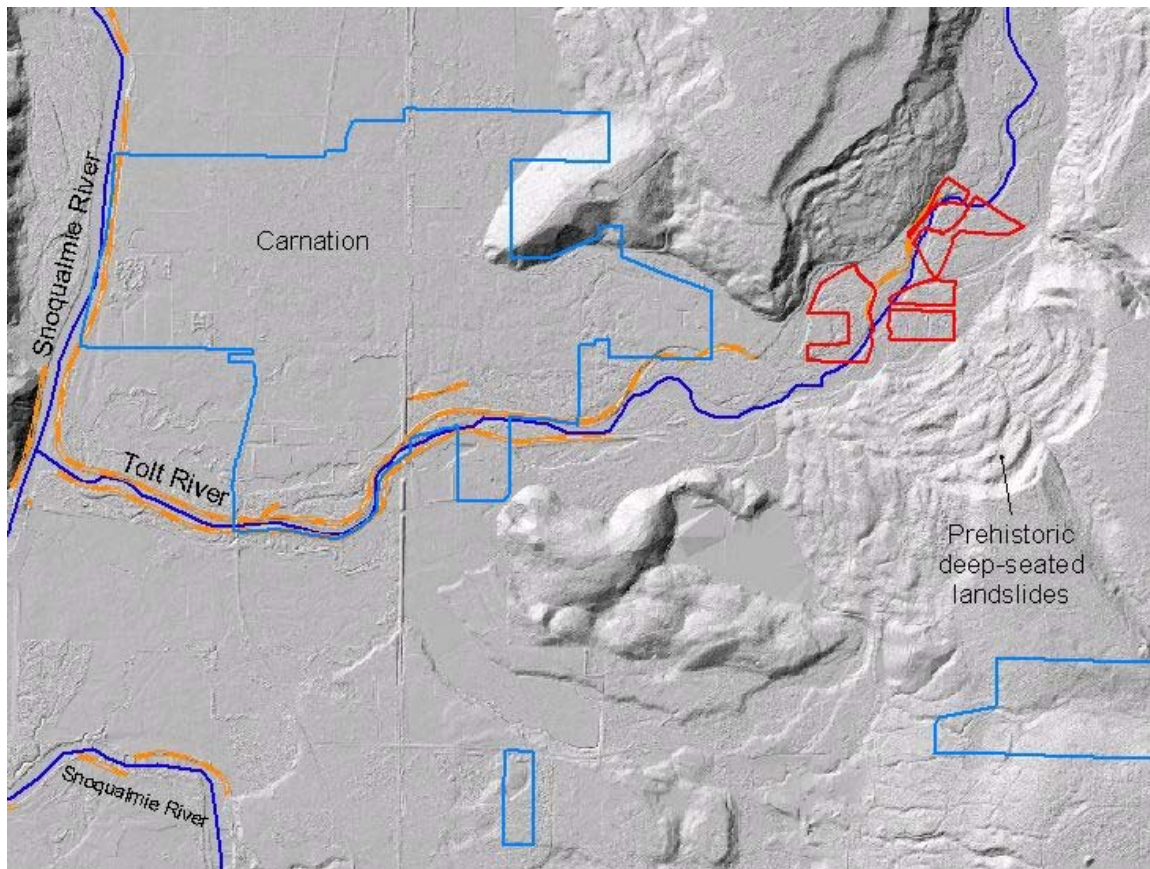
Channel Migration and the Historic Floodplain

The floodplain in this reach averages about 1,500 ft in width and is constrained by steep slopes on either side that widen as the river moves downstream. Many factors have helped create the floodplain over time, including geologic events, levees and revetments, logging, dam construction, and the presence of large woody debris.

Two levees are in place within the Tolt River Natural Area, and with only two small exceptions at RM 4.6 (~2 river miles upstream of the Natural Area) these are the upstream-most erosion or flood control facilities along the Tolt River until the South Fork Tolt Reservoir dam⁴ at RM 8.5. Just downstream of the Natural Area “at about river mile 2.0, the Tolt emerges from its tributary valley into the mainstem Snoqualmie Valley” (Bethel 2004). The lower 1.7 river miles of the Tolt River are entirely leveed and therefore no channel migration is possible (Figure 3), though flooding does still occur.

⁴ The dam is considered a water-supply reservoir and not a flood control facility.

Figure 3. Tolt River Valley where the Tolt River confluences with the Snoqualmie River. City of Carnation is outlined in light blue. Tolt River Natural Area is outlined in red. Prehistoric landslide areas are evident on either side of the Tolt River Valley adjacent to the Natural Area. Levees and revetments are orange lines. (scale: 1" = 0.5mi.)



Many of the geological features, events, and impacts on the Tolt River are described by Bethel (2004, p. 68):

From the confluence of the [north and south river] forks at river mile 8.8, the mainstem flows through a steep-sided valley at a gradient of approximately 1 percent. In this reach, the Tolt varies between a single-thread and braided morphology. Historical research shows that the morphology and channel location in this reach are subject to rapid and dramatic shifts, sometimes during a single flood event (Shannon and Wilson 1991). Because of the rapid rate of channel change in this area, King County has designated a broad belt adjacent to the channel as an area of “severe channel migration hazard.”

Bethel (2004, p. 41) also describes the deep-seated landslides common in the Snoqualmie Valley that occurred along the valley walls of the Tolt (Figure 3):

These slides are typically located on valley walls often in areas where the valley wall is underlain by fine-grained glacial units. Most of these larger landslides are prehistoric features, some probably dating back to immediately post-glacial time. Although old, many of these landslides remain marginally stable and could be reactivated by periods of wet weather, seismic activity, or human modification.

On a more recent and slightly smaller time scale, large woody debris plays an important role in the river's morphology. According to a report entitled "Lower Tolt River Floodplain Reconnection Alternatives and Analysis" (Parametrix 2004), "historic maps show a more complex, sinuous channel than exists in the currently channelized lower Tolt River reach." Much of the channel complexity is retained in the Natural Area reach and further upstream. According to the Parametrix report, "large woody debris jams play a much greater role in developing channel complexity" within the reaches upstream of RM 1.7. Indeed, two large debris jams are currently in place within the Natural Area (Figure 2). In unconfined portions of the river in this reach, a normal range of channel forms, slopes, widths, depths, and velocities were observed by Parametrix staff.

The Parametrix (2004) report also summarizes sediment transport and the effects of the South Fork Tolt Reservoir dam. Past timber harvest and road building caused an increase of sediment production in the past, and although those practices have improved or stopped altogether since the 1980s, that sediment is still in transit. This increased bedload may increase flooding and reduce fish habitat by filling the channel and reducing the number and depth of pools, although it is possible that the new sediment may help create more suitable spawning areas. Because of the water storage function of the dam, flood frequency and size has been reduced on the Tolt River, and as a result, the river is less likely to experience widespread braiding and channel shifting that occurred during large flood events in the past. Despite all these dam-related factors, conditions in the reach surrounding the Natural Area still indicate that functioning salmonid habitat exist and that habitat-forming channel processes occur (Parametrix 2004).

As mentioned above, two levees are present at the Tolt River Natural Area. The upstream-most levee protects Tolt River Road, and the second levee (Edenholm levee) protects two residences. The first levee runs along the edge of the floodplain in places and so does not restrict the movement of the river greatly. The second levee encroaches into the floodplain more than the first, though it has already been partially breached by the river (K. Anderson, pers. comm.). The second levee constrains the river where still intact.

The river currently flows straight through the southern end of the Natural Area though no levees are constraining it there. The river breached a levee in the early 1990s and took its current shape in this location (Anderson, pers. comm.), where it is beginning to move into the left bank and increase its sinuosity (location of breach is below downstream end of levee in Welk property; see figures 1 and 2). Although more floodplain area lies beyond the right bank, the direction of the flow is currently not carrying the river in that direction. However, with the lack of constraint, the channel may again one day occupy the floodplain on the right bank.

Upland Community Types

Very little upland is present in the Tolt River Natural Area, as the majority of the Natural Area lies within the floodplain of the Tolt River. A small portion of upland forest is present in the Fry property, and a meadow area lies within the Left Bank property.

Forest

A small portion of the Fry property is a remnant upland forest, the center of which had been cleared for a home site (F-2 on Fry property, Figure 1). This clearing has been planted with native plants, but non-natives are still present though not dominant here. The dominant canopy tree is western redcedar with bigleaf maple sub-dominant. Average coniferous diameter was 22" and deciduous average diameter was 14". Douglas-fir and red alder were also present. Vinemaple dominates the understory. The dominant shrub present is salmonberry with thimbleberry, elderberry, and Indian plum present. Swordfern was the dominant herbaceous species with bleeding heart, fringe cup, and avens (*Gallium* spp.) present. Canopy closure was 50 percent. Snags were rare, though the one present was a 30" DBH conifer that was still hard.

Meadow

The middle fifth of the Left Bank property is a hummocky meadow with 4" of silty soil on top of cobble. The grasses present were mostly tall, with scattered sedge species and rush species present. Reed canarygrass was the dominant grass, but at the upper end of the meadow it did not seem to exclude other herbaceous species. Wild strawberry was also present here. Dispersed patches of snowberry (dominant), Indian plum, and salmonberry were present in the upper end of the meadow. The northern most end of the meadow is transitioning to forest with bigleaf maple, red alder, vine maple, and black cottonwood all present in small numbers. The red alder saplings were 1.5" in diameter and 10 feet tall.

Invasive plants species were the dominant cover in the lower half of the meadow. Reed canarygrass was the dominant vegetation in this end along with avens. Large patches of Himalayan blackberry seemed to be centered around snags. Holly was also growing along the edges of the meadow. At the southern end of the meadow, reed canarygrass was growing among a patch of young Douglas-fir and some bigleaf maple, the diameters of which averaged 8".

Native vegetation was also present in the meadow area. Some salmonberry was present as well as sparsely distributed red alder. Deciduous snags were scattered throughout the meadow; their age, degree of decay, and distribution suggests a single disturbance event killed the widely spaced trees and may have been responsible for the formation of the meadow itself. The origin of the meadow is uncertain; although there appears to be no difference in elevation, it is possible standing flood water drown the trees in this area. It is possible the river channel flowed through this location in the past and the subsequent sediment that filled in the channel is unique for the area and resulted in a unique plant assemblage that did not survive with the surrounding forest. The soil composition in this area indicates the area has been affected by the river's sediment deposition in the past, and the current dryness of the soil indicates it is not regularly inundated at present.

Fish and Wildlife

According to Haring (2002), chinook, chum, pink, and coho salmon and steelhead trout all use the Tolt River. Solomon and Boles (2002) observed spawning pink and chinook salmon throughout the reach when they walked it on October 2, 2001.

Deer tracks were seen on all of the properties and beaver sticks were seen on the edges of the Edenholm side channel. Townsend's mole mounds were seen in the meadow.

Along the Tolt River, mergansers, northern rough winged swallows, a spotted sandpiper, and an osprey were seen. The osprey was flying over the river, very likely fishing. Numerous bird species were seen or heard within the riparian forests including: red-bellied sapsucker, Swainson's thrush, blackheaded grosbeak, western tanager, Pacific slope flycatcher, red-tailed hawk, black-capped chickadees, and hairy and downy woodpeckers (see Appendix for list of species observed on-site).

Snags that could provide nesting and roosting habitat were found on all the properties. Snags were common to rare and of small diameter (8-16") on the Left Bank and Fry properties. Snags were still rare but of larger diameter from 18 to 30" in the forest of the Welk property. Cottonwoods and bigleaf maple are more evenly distributed on the Welk property.

Human Activity

Human activity varies widely on the Welk property. The presence of lawn chairs at the edge of the river indicate river use by people. The prior landowner bulldozed and maintained trails wide enough for driving. And a portion of a levee lies along the Natural Area here. The trails through the Welk property are mowed frequently enough to keep the oft-occurring blackberries at bay. The trails are grass covered

and so are likely not used frequently. It is likely that only a few local residents use these trails because access is through a private driveway. These trails are likely to be a source of invasive plants.

Access to the Left Bank property is via an unmaintained access road. It does not appear to be used frequently by people, but is a probable in-route for non-native plants to extend their range and disperse into the Natural Area. The access road leads to a small former cabin site at the north end of property.

At the Fry property on the right bank, the shoulder along Tolt River Road is wide, and where the parcel is narrowest between the river/levee and the road, that portion of the Natural Area is covered in gravel. People park there to go fishing and enter the river to swim or use inner tubes. A site was previously cleared for a home that was never built; this site has been revegetated and abuts the road, driveway, river, and levee. At the Fry Island area, there is very little human activity. Likely this low amount of use results from the difficult access.

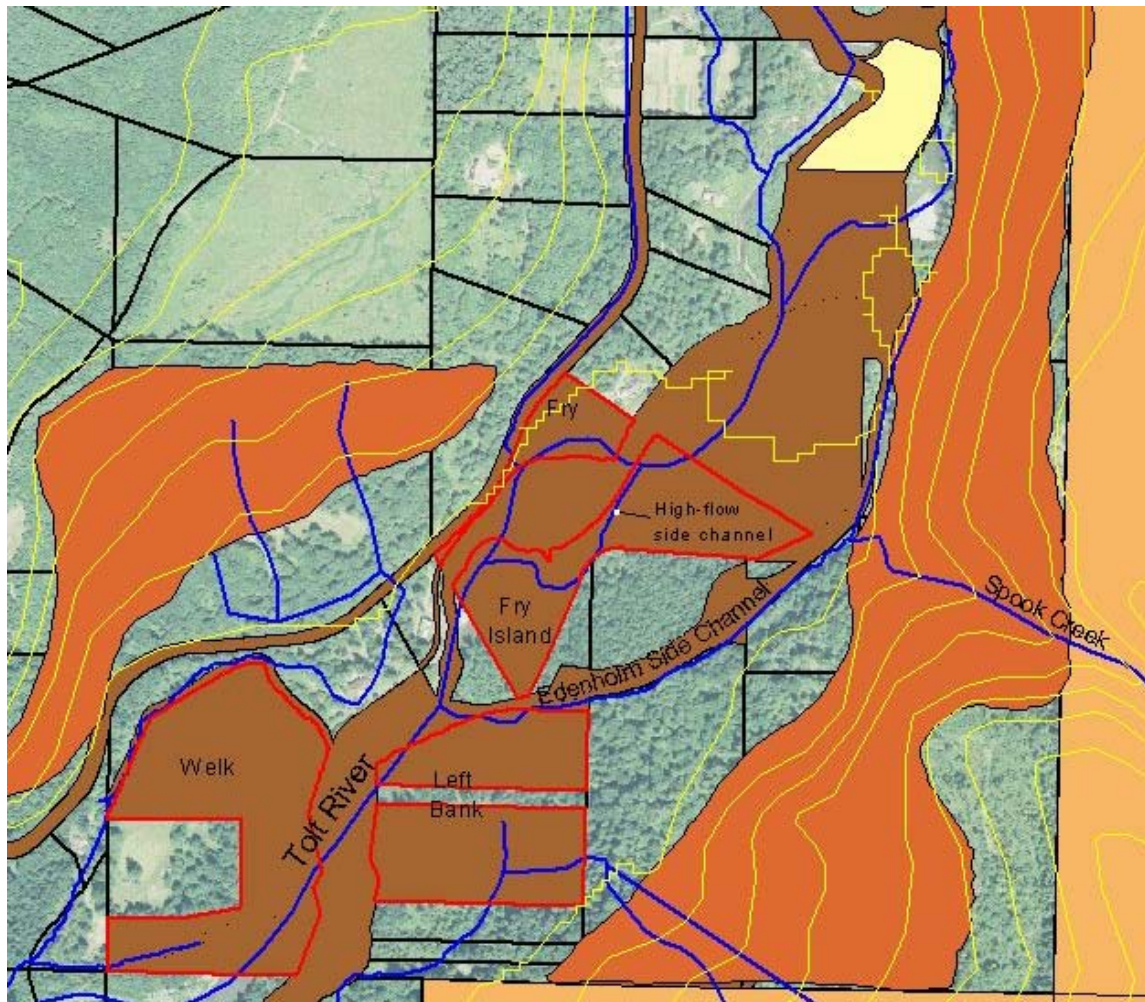
Connectivity and the Landscape

The Tolt River Natural Area lies at an approximate elevation of 140 ft and is mostly flat. The Natural Area is entirely within the Eastern Puget Uplands of the Puget Lowlands Ecoregion⁵. This ecoregion was formed in large part by glaciers in the last ice age. According to mapped data, soils present in the floodplain are Pilchuck loamy fine sand and riverwash. The Natural Area lies almost entirely within the floodplain and almost all soils present on site are either Pilchuck loamy fine sand or riverwash. Alderwood and Kitsap soils are on the steep slopes to the south of the river and Alderwood gravelly sandy loam are on 15-30 percent slopes north of the river.

As mentioned above, the Tolt River valley is bounded by relatively steep slopes, and these slopes restrict the width of the floodplain. The Tolt River Natural Area lies just outside the Urban Growth boundary and just west of the forest production district. The river in this area flows south-southeast. On the right bank (northwest of the river) from the Natural Area upstream to river mile 7 lie residential properties. On the left bank from RM 2.5 (same area as Natural Area) and on the right bank from RM 7, the forest production district begins, and most properties are owned by timber companies (Figure 4). The forest lands both within and upstream of the Natural Area have been logged in the past and are a patchwork varying in stages of growth, ranging from clearcuts to patches of second-growth and third-growth (see below).

⁵ Ecoregions denote areas of general similarity in ecosystems and in the type quality, and quantity of environmental resources (Omernik 1985).

Figure 4. Dark brown indicates lands owned by King County or waters of the state (default ownership to WDNR). Yellow land is in conservation easement. Tan indicates lands in the forest production district. Red-brown indicates lands in the steep slope hazard area. Purple lines are roads. Yellow contour lines are at a 50 ft interval and provide indication of slopes outside floodplain. (scale: 1" = 0.16mi.)



During the development of the new Critical Areas Ordinance, a course-screen filter was applied to basins in King County to determine basin condition (see Draft “Critical Areas Ordinance Companion Paper: Approach for Developing Basin and Shoreline Conditions Map,” King County 2004). This process involved evaluating the basin condition using eight criteria: salmonid use, land use context (percent of designated rural and forest production land uses in surrounding basins), acreage of Class I wetlands, presence or proximity of a priority species or habitat, presence of wildlife network, percent of vegetative cover, percent of impervious area, and road density. The lower Tolt River area was ranked high using this broad determination of basin condition. One criteria the basin did not score highly on was the total acreage of Class 1 wetlands. Although wetlands surely exist in this basin, there appear to be very few large, open water or vegetatively complex mapped wetlands. Perhaps there are other wetland classes present, although almost none are mapped.

As mentioned above, forest lands both within and upstream of the Natural Area have been logged in the past and are a patchwork varying in stages of growth, ranging from clearcuts to patches of second-growth and probably third-growth. Figure 5 and Figure 6 show the landcover in these areas as mapped in the

County's GIS. (Note that these maps frequently indicate shrub cover or bare earth in the place of a clearcut.) The upper Tolt basins and adjacent basins have large stands of conifer forest (totaling approximately 17,000 acres), but in the immediate vicinity of this Natural Area, which is in lower elevations and dominated by mixed forest, conifer stands constitute relatively small patches (range of 0.6-247 acres). Within the Natural Area itself are three conifer patches (sizes are 0.4, 1.0, and 9.4 acres). The lower basin near this Natural Area contains large patches of mixed forest (totaling approximately 5,000 acres).

Figure 5. North Fork, South Fork, and Lower Tolt basins are outlined in yellow. Landcover in basins upstream of Tolt River Natural Area vary widely. Tolt River Natural Area is located in the lower left corner (southwest corner) of the map within the Lower Tolt basin. (scale: 1" = 3mi.)

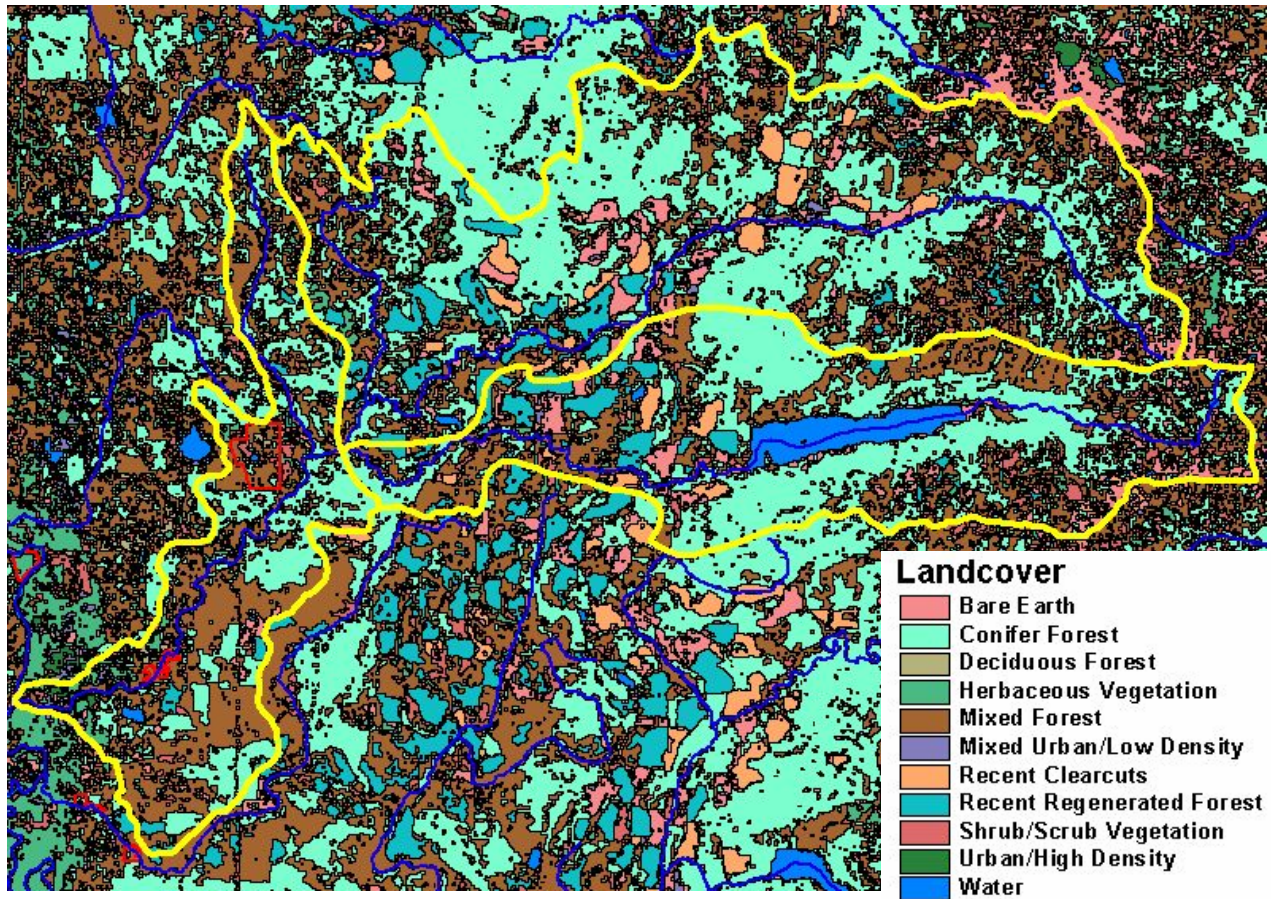
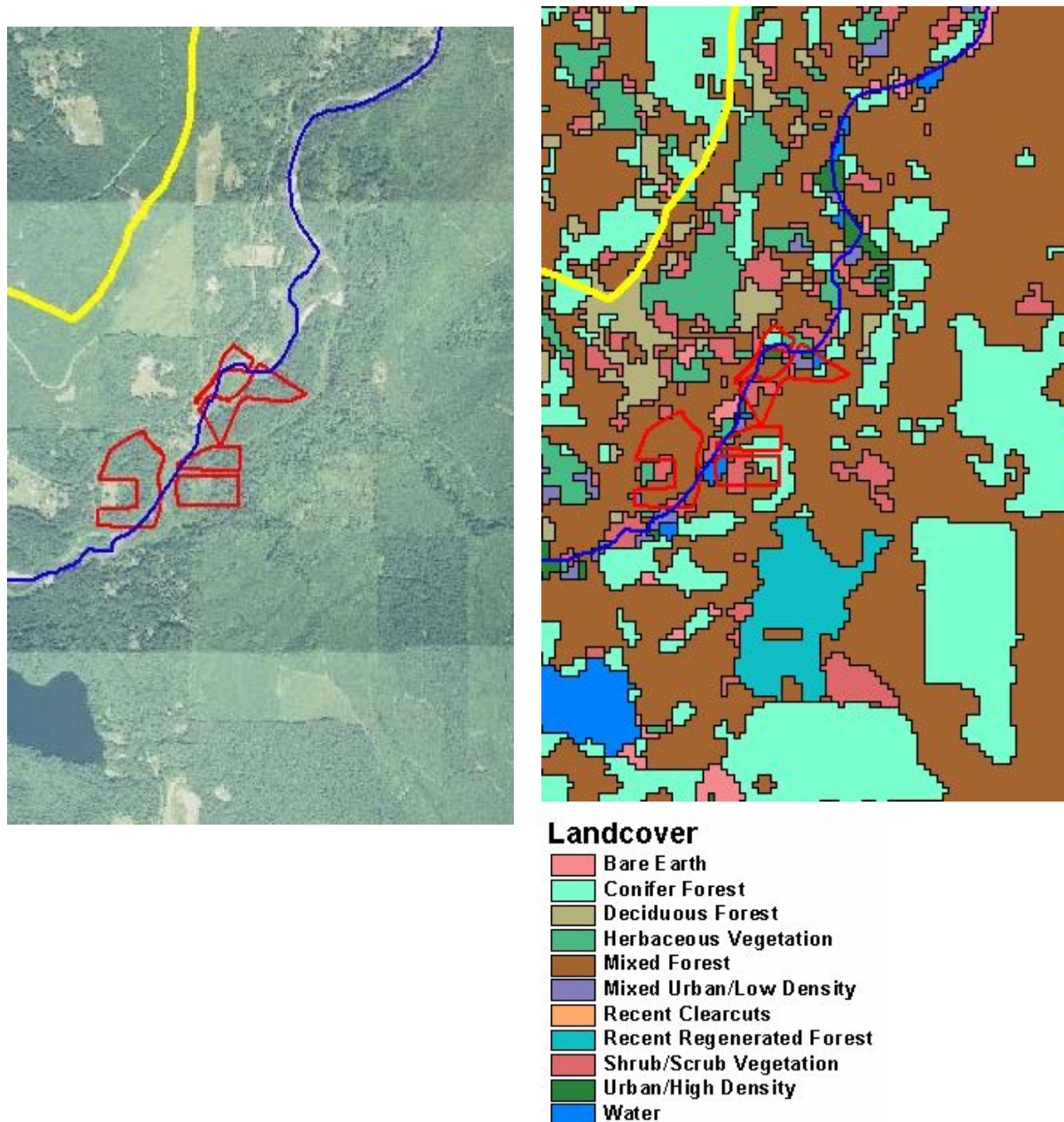


Figure 6. Landcover illustrated in Tolt River Natural Area vicinity with aerial photo (left) and landcover map (right). Red polygons indicate Natural Area. Blue line is Tolt River. Yellow line indicates basin boundary. (scale: 1" = 0.5mi.)



In the vicinity of the Natural Area, there are small pieces of land throughout the reach that were riverbed when property lines were originally drawn. Default ownership for these “lands of the state” lies with Washington State DNR, but it is unlikely WDNR has plans for active management of these lands that fill gaps between the properties comprising this Natural Area. On the right bank, two private properties create a gap in the Natural Area between the Fry property and the Welk property. Both of these properties have houses on them. A large inholding in the Welk property is also the site of a single-family residence. On the left bank side of the Natural Area, spatial gaps are all forested and currently lack development.

Several parcels surrounding the Natural Area are also in private ownership. One of the private properties has a conservation restriction on it so that it will remain in native vegetation in perpetuity (Figure 4). To the north of the Natural Area lies one parcel owned by King County (Flood Hazard Reduction Program);

it is possible ownership may some day shift to Natural Resource Lands and therefore make this parcel part of the Natural Area. Some undeveloped parcels to the south of the Natural Area in the floodplain are owned by the Girl Scouts and currently support little or no use. City of Seattle owns a large parcel downstream of the Girl Scout land and manages it for habitat conservation. Outside the floodplain there are some large lots with single residences on them. Some of those properties are up on the hill and are presumably not directly impacting the aquatic system.

The Wildlife Habitat Network follows the Tolt River and therefore passes through this Natural Area. The Critical Areas Ordinance-codified Wildlife Habitat Network is intended to be 300 feet wide, but may be reduced to 150 ft wide. With the exception of grandfathered land uses (and possible illegal clearing), the presence of the network ensures a vegetated corridor will remain protected along the Tolt River. Stream buffers of 165 ft in the new ordinance may further protect a vegetated corridor along the river with smaller buffers adjoining creeks and side channels. Because the entire area upstream of the Natural Area will remain in forest production, a continual patchwork of forest will remain in the basin. The habitat value of these areas will vary depending on their location, including their contiguity to aquatic areas and each other. The habitat value of these areas will also depend on the age and species complexity of the forest, and because these areas are often second- and third-growth forestry stands, they are often comprised of low habitat value monocultures of Douglas-fir.

Site Considerations

The information in this report may be used to answer broader questions about the ecology of the Tolt River Natural Area, and answers to those questions (such as presented in the Ecological Lands Handbook, King County 2003) may be used in the process of generating long-term management plans for the site. It should be kept in mind that this Natural Area is a relatively small piece of land that would best be managed in the context of the greater landscape, and so the effectiveness of actions on-site may be limited by external influences, such as land use upstream. The following considerations are based on preliminary observations and may require immediate attention, further on-site studies, or future consideration.

Site-Specific Considerations

The following observations for the conservation of the Tolt River Natural Area are on a site-specific level. Management actions at the scale of the site should always be made in consideration of the context of the site (the landscape).

Invasive Weeds

As mentioned in the meadow section above, Himalayan blackberry and reed canarygrass covered large areas of the meadow on the Left Bank property. The patches of blackberry were extensive, and the reed canarygrass was dense. Nevertheless, the meadow habitat is in transition to forest, but it is uncertain if the tree canopy will be dense enough to shade out the ubiquitous blackberry and reed canarygrass. Large blackberry patches also line the mowed patches of the Welk property and are well established in the east-northeast running openings on the property. It appears the blackberry is eventually overtopped and eliminated by taller species such as, red alder as seems to be occurring at the Welk property.

Himalayan blackberry is present in large amounts on the Fry property on the right bank of the river, and blackberry and reed canarygrass are sparsely present along the river, side channel, and tributaries of the Fry Island portion. Small patches of Himalayan blackberry are embedded in the forest. These patches are approximately 30x40 feet in area and do not extend into the adjoining forest. Here the canopy is closed with few gaps and should prevent further spread of blackberry and reed canarygrass within the forest. Shade tolerant invasives are more worrisome. Specifically, some ivy was seen and pulled between sites 2 and 3, and a large clematis spp. vine was seen between sites F-4 and F-5 on Fry Island.

The Fry Island area is a closed-canopy riparian forest with very few invasive plants and numerous conifer saplings in the understory. The major routes of transport of invasive plants into the site appear to be water, but thus far densities are low. Management of this part of the Natural Area might include a walk through the property every 2 or 3 years to remove invasive plants.

Ivy and holly were seen in small amounts at all of the sites. Two adjacent trees (western redcedar and bigleaf maple) on the Welk property were covered with massive ivy infestations; removal would require a saw. Along with other invasives, these two shade-tolerant species require monitoring to ensure they are not returning or establishing new growth in the Natural Area.

Butterfly bush is present in large numbers at the Welk and Fry properties. Some upstream lands are presumably also infested, and downstream spread via the river corridor is likely ongoing. Eradication would be difficult and may involve working with landowners upstream and in other parts of the basin. Although some other pioneering species are present, such as willow, alder, and cottonwood, butterfly bush dominates at most of the sites where river cobbles are exposed (not found at the Left Bank site).

The trails at the Welk property that are currently mowed are good candidates for planting with native trees and shrubs. If these openings are planted and mulched to keep the blackberries out, over time as the area reverts to native vegetation, it will no longer need the continued maintenance of mowing.

At the Left Bank property, non-native weedy species are present such as dock, birds-foot trefoil, creeping buttercup, and herb robert, though no invasives were present along the property access road.

Other Ecological Enhancement

It should be determined if the oak species observed on site is the native Oregon white oak, and if so, it should be determined if a seed source exists in the vicinity⁶. Based upon the moisture conditions, it is unlikely the species present is Oregon white oak, and the unlikelihood makes species confirmation that much more important. Moreover, it is important to establish if they are a result of human dispersal, remnant native plants, or natural outliers to their range.

A culvert is in place at the access road that crosses the small tributary at the Left Bank property. If the final inholding property were acquired, removal could be considered. The culvert does not appear to be a fish passage barrier, however, its removal might reduce erosion, would day-light that section of the stream so natural vegetative communities could re-establish, and would re-establish a natural stream corridor.

Consideration of Landscape Attributes and Processes

The lands comprising the Tolt River Natural Area were previously owned by different landowners. Properties acquired over time from the various landowners form the current Natural Area, which may continue to grow in size as future acquisitions become possible. Some gaps in County ownership remain, and filling the gaps should be considered a priority in this area. Acquisition of the remaining inholding on the Left Bank property would prevent development from occurring in the middle of the Natural Area on the left bank of the river. Acquisition of other private lands along the river would seal the gaps between the different properties of this natural area, and acquisition of lands upstream on the Tolt and lands adjacent to Spook Creek would assure no development would occur between the forest production district and this Natural Area (Figure 4). However, with the presence of the steep slope hazard area, it is possible development will not be possible in much of this area. Very little of the lands between the Natural Area and the forest production district have been developed thus far.

Because the upstream levee on the Natural Area protects a road, it will not likely be removed; however, it is possible a retrofit might improve the edge quality. Currently, the bank is a complete rock face. If it

⁶ For WDFW's management recommendations for Oregon White Oak, see: <http://www.wdfw.wa.gov/hab/oakfinal.pdf>.

were bioengineered, vegetation at the river's edge could hang out over the water to provide benefits including shade, insects, and detritus.

The second levee protects one or two houses and cuts off much more floodplain from river migration. That levee has already been partially breached by the river, and partial removal or setback (or a combination) might be an effective strategy for reconnecting the floodplain in this area.

The dynamics caused by the river's interaction with the floodplain is currently the predominant immediate factor controlling habitat types in this Natural Area. As mentioned above, the Tolt River continues to move downstream sediment loads that are a result of past land management. Sediment transport as well as changes in flooding regimes, aggradation, and avulsions will affect the vegetation composition and age distribution in the river valley. These changes are the natural progression given current anthropomorphically influenced conditions on the Tolt, and they should be considered when planning for land management in the Tolt River Natural Area.

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Appendix: List of Species Observed On Site

Key: F=Forest (may include any forest type); R/S=Riparian/Stream; M/G=Meadow/Grassland.

COMMON NAME	SCIENTIFIC NAME	ECOTYPE		
Plants: Wildflowers / Herbs				
Suksdorf's mugwort	<i>Artemesia suksdorfii</i>		R/S	
Enchanted nightshade	<i>Circaea alpina</i>	F	R/S	
Bleeding Heart	<i>Dicentra formosa</i>	F		
Foxglove	<i>Digitalis purpurea</i>	F		
Fireweed	<i>Epilobium angustifolium</i>	F		
Wild strawberry	<i>Fragaria virginiana</i>	F		
Bedstraw	<i>Galium spp.</i>	F		
Large-leaved Avens/Geum	<i>Geum macrophyllum</i>	F	R/S	
Cow-parsnip	<i>Heracleum lanatum</i>	F		
Waterleaf	<i>Hydrophyllum tenuipes</i>	F		
Hairy Cat's ear	<i>Hypochaeris radicata</i>		R/S	
Wild cucumber	<i>Marah oreganos</i>	F		
Spring Beauty/Miner's Lettuce	<i>Montia spp.</i>	F		
Coltsfoot	<i>Petasites frigidus</i>	F		
Creeping Buttercup	<i>Ranunculus repens</i>	F	R/S	
Dock	<i>Rumex spp.</i>	F		
Starflowered false solomon's seal	<i>Smilacena stellata</i>	F		
Cooley's Hedgenettle	<i>Stachys cooleyae</i>		R/S	
Fringecup	<i>Tellima grandiflora</i>	F		
False Mitrewort	<i>Tiarella trifoliata</i>	F		
Youth-on-age / Piggy-back plant	<i>Tolmiea menziesii</i>	F		
Bigsting Nettle	<i>Urtica dioica</i>	F		
American Speedwell/Brooklime	<i>Veronica americana</i>		R/S	
Plants: Grasses				
Grass	<i>Graminea spp.</i>		R/S	
Velvet Grass	<i>Holcus lanatus</i>	F	R/S	
Plants: Invasive and non-invasive non-native plants				
Butterfly bush	<i>Buddleia</i>	F	R/S	
Canada thistle	<i>Cirsium arvense</i>		R/S	
Clematis	<i>Clematis sp.</i>	F		
Scot's Broom	<i>Cytisus scoparius</i>		R/S	
Herb Robert / Stinking Bob	<i>Geranium robertianum</i>	F		
English Ivy	<i>Hedera helix</i>	F		
Holly	<i>Ilex spp.</i>	F		
Reed Canarygrass	<i>Phalaris arundinacea</i>	F	R/S	
Himalayan Blackberry	<i>Rubus discolor</i>	F	R/S	
Plants: Rushes & Sedges				
Sedge	<i>Carex spp.</i>		R/S	
Rush	<i>Juncus spp.</i>	F	R/S	

COMMON NAME	SCIENTIFIC NAME	ECOTYPE		
Plants: Ferns & their Relatives				
Maidenhair Fern	<i>Adiantum pedatum</i>	F		
Lady Fern	<i>Athyrium felix-femina</i>	F		
Common or Mountain Woodfern	<i>Dryopteris austriaca</i>	F		
Common Horsetail	<i>Equisetum arvense</i>		R/S	
Horsetail	<i>Equisetum spp.</i>	F	R/S	
Licorice Fern	<i>Polypodium glycyrrhiza</i>	F		
Sword Fern	<i>Polystichum munitum</i>	F		
Bracken Fern	<i>Pteridium aquilinum</i>	F		
Plants: Shrubs				
Vine Maple	<i>Acer circinatum</i>	F		
Red-osier Dogwood	<i>Cornus stolonifera</i>	F	R/S	
Hazelnut	<i>Corylus cornuta</i>	F		
Indian Plum (Osoberry)	<i>Oemleria cerasiformis</i>	F		
Devil's Club	<i>Oplopanax horridus</i>	F		
Ninebark	<i>Physocarpus capitatus</i>	F		
Cherry	<i>Prunus spp.</i>	F		
Wild Crabapple	<i>Pyrus fusca</i>	F		
Black Gooseberry	<i>Ribes lacustre</i>	F		
Stink Currant	<i>Ribes bracteosum</i>	F		
Red Currant	<i>Ribes sanguineum</i>	F		
Rose	<i>Rosa spp.</i>	F		
Thimbleberry	<i>Rubus parviflorus</i>	F	R/S	
Salmonberry	<i>Rubus spectabilis</i>	F	R/S	
Trailing Blackberry	<i>Rubus ursinus</i>	F		
Willow (Sitka)	<i>Salix sitchensis</i>		R/S	
Willow	<i>Salix spp.</i>	F	R/S	
Red Elderberry	<i>Sambucus racemosa</i>	F		
Hardhack	<i>Spiraea douglasii</i>	F		
Common Snowberry	<i>Symphoricarpos albus</i>	F		
Red Huckleberry	<i>Vaccinium parvifolium</i>	F		
Plants: Trees				
Big Leaf Maple	<i>Acer macrophyllum</i>	F	R/S	
Red Alder	<i>Alnus rubra</i>	F	R/S	
Pacific Dogwood	<i>Cornus nuttallii</i>	F		
Sitka Spruce	<i>Picea sitchensis</i>	F		
Black Cottonwood	<i>Populus trichocarpa</i>	F	R/S	
Douglas Fir	<i>Pseudotsuga menziesii</i>	F		
Oak sp.	<i>Quercus sp.</i>	F		
Cascara	<i>Rhamnus purshiana</i>	F		
Western Red Cedar	<i>Thuja plicata</i>	F		
Western Hemlock	<i>Tsuga heterophylla</i>	F		
Mammals				
Black Tailed Deer	<i>Odocoileus hemionus</i>	F		
Douglas Squirrel (chickaree)	<i>Tamiasciurus douglasi</i>	F		
Birds				
American Crow	<i>Corvus brachyrhynchos</i>	F		

COMMON NAME	SCIENTIFIC NAME	ECOTYPE		
American Goldfinch	<i>Carduelis tristis</i>		R/S	
Belted Kingfisher	<i>Ceryle alcyon</i>		R/S	
Black-capped chickadee	<i>Poecile atricapilla</i>	F		
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>		R/S	
Cassin's vireo	<i>Vireo cassinii</i>	F		
Chestnut-backed chickadee	<i>Poecile rufescens</i>	F		
Common Merganser	<i>Mergus merganser</i>		R/S	
Dark-eyed Junco	<i>Junco hyemalis</i>	F		
Downy Woodpecker	<i>Picoides pubescens</i>	F		
Hairy Woodpecker	<i>Picoides villosus</i>	F		
House finch	<i>Carpodacus mexicanus</i>	F		
Killdeer	<i>Charadrius vociferus</i>		R/S	
Northern flicker	<i>Colaptes auratus</i>	F		
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>		R/S	
Osprey	<i>Pandion halieetus</i>		R/S	
Pacific slope flycatcher	<i>Empidonax difficilis</i>	F		
Purple Finch	<i>Carpodacus purpureus</i>	F		
Raven	<i>Corvus corax</i>		R/S	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	F		
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	F	R/S	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	F		
Robin	<i>Turdus migratorius</i>		R/S	M/G
Rufous Hummingbird	<i>Selasphorus rufus</i>	F		
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>		R/S	
Song Sparrow	<i>Melospiza melodia</i>	F		M/G
Spotted Sandpiper	<i>Actitis macularia</i>		R/S	
Steller's Jay	<i>Cyanocitta stelleri</i>	F		
Swainson's Thrush	<i>Catharus guttatus</i>	F		
Western Tanager	<i>Piranga ludoviciana</i>	F		
Winter Wren	<i>Troglodytes troglodytes</i>	F		
Yellow Warbler	<i>Dendroica petechia</i>	F		
Fish ⁷				
Coastal / Sea-run Cutthroat Trout	<i>Oncorhynchus clarkii</i>		R/S	
Pink Salmon	<i>Oncorhynchus gorbuscha</i>		R/S	
Chum Salmon	<i>Oncorhynchus keta</i>		R/S	
Coho Salmon	<i>Oncorhynchus kisutch</i>		R/S	
Rainbow and Steelhead Trout	<i>Oncorhynchus mykiss</i>		R/S	
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>		R/S	

⁷ All fish species listed here were reported by other authors and were not seen during the Spring 2004 inventories. For additional information, see the Fish and Wildlife section of this report.